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ABSTRACT

A four-semester undergraduate program in educational research was developed to provide training for those interested in specializing in the field and to provide a general knowledge of educational research for prospective teachers. Thirty students were selected for the first pilot group on the basis of academic ability and interest in research. This group and two control groups were pretested and posttested on their attitudes toward research, educational aspirations, occupational aspirations, and attitudes toward the undergraduate program. Results showed that experimental group members received higher posttest scores on all criterion measures than persons in either control group. There was also a significant positive change for experimental group members in educational aspirations and attitudes toward the undergraduate program. A longitudinal study of graduates showed that half were employed in research, development, or evaluation. In addition, a survey of 100 public school administrators showed that there are job openings and an anticipated increased demand for personnel with training in research, development, and program evaluation. Future plans include improvement of the undergraduate program and the development of a graduate program aimed at students from all fields who have had no previous training in educational research. (RT)

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FINAL REPORT
Project No. 3191
Contract No. OE-6-10-146

INVESTIGATION OF FACTORS INFLUENCING THE TRAINING OF EDUCATIONAL RESEARCHERS

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AUTHOR'S NOTE

This report covers a period of activity funded from federal sources extending from October 1st, 1965 through March 31, 1968. Selected activities supported by local funds and conducted through June 1, 1969 are also covered. Additional activities, supported by local funds, have been reported through other channels. Some of these activities are still underway and will be reported through publications and presentations now being prepared. For the benefit of the interested reader, we are listing below these other sources through which additional information may be obtained concerning the developmental efforts in research training being conducted at Ohio State.

1. Altschuld, J.W., "A Study of an Experimental Training Program In Educational Research and Development - The Measurement and Analysis of Factors Predictive of Graduate Student Success," Unpublished Dissertation, The Ohio State University, 1970.

2. Altschuld, J.W., and Sakumura, J.S., "Course Development and Evaluation Techniques", Paper to be presented at the Fourth Annual National Symposium for Professors of Educational Research, St. Louis, Missouri, Phi Delta Kappa, November, 1970.

3. "The Development and Evaluation of Undergraduate and Graduate Research Curricula" Paper Session at the 1970 AERA Annual Meeting, Robert Bargar, Session Chairman.

   Participants:
   Program Rationale and Descriptions, Robert Bargar
   Evaluation Design, James W. Altschuld
   Instrument Development, Corahann P. Okorodudu
   Results and Discussion, Edward P. Dworkin and Joseph Sakumura

4. Dworkin, E.P., "Recruitment For Inquiry in Education", Unpublished Dissertation, The Ohio State University, 1969.

5. Monograph in preparation to be published by Phi Delta Kappa, tentatively entitled, "Developing and Evaluating Graduate and Undergraduate Research Training Curricula in Education," Edited by Robert Bargar. Contributors to include: James Altschuld, Robert Bargar, Edward Dworkin, William Gephart, James Gunnell, Corahann Okorodudu and Joseph Sakumura.

6. Sakumura, J.S., and Altschuld, J.W., See Item 2 above.

7. Sakumura, J.S., "An Analysis of an Experimental Educational Research and Development Program for Talented Undergraduate Education Students", Unpublished Dissertation, The Ohio State University, 1969.

8. An in-depth study of instruments designed to measure various aspects of research skills and attitudes is now underway. Main contributors to this endeavor are Joseph Sakumura, James Altschuld and John Kennedy.

PREFACE

On September 1, 1965, the contract for Cooperative Research Project No. 3191 entitled, "An Investigation of Factors Influencing the Training and Nurture of Educational Researchers," was negotiated and signed. In its original form the purposes of this project were two-fold: first, to integrate all available literature dealing with the topic of research training in Education, and second, to provide definitive data concerning the nature of the problem at the national level through a comprehensive national survey. The major focus of the survey was to be upon those factors which influenced training and productivity of researchers in the field of Education. The project as originally contracted was to have run through September 30, 1967.

The initial phase of the project involved a review of literature on research training in Education. During the initial stages of compiling this review it was discovered that while studies directly in the field of Education were relatively scarce, there were a number of facets of the problem which extended outside of the immediate topic of research training and for which there was a considerable body of literature. Also during this initial phase of the project, Dr. Lee G. Burchinal, then Director of the Research Training Branch of the U.S. Office of Education, requested that the project staff produce a definitive review of research that could be used by the U.S. Office and other professional agencies in making further policy decisions concerning research training. As a result of these two factors, the review of research was expanded considerably beyond its original scope. This then represented the first of several changes in the original contract.

The second and most comprehensive change in the nature of the original contract came as a result of the conclusions drawn from the expanded review of research. First, it became obvious that there were sufficient data available from already existing studies to provide an adequate view of the problem at the national level. While the present contract as originally conceived, would provide the most comprehensive and definitive single set of data, the conclusions reached from the review of research indicated that compiling such data was no longer as critical as had once been assumed. At the same time, a range of problems had been uncovered by the review which, in the opinion of the project staff, were more challenging and potentially more important to the profession than the survey as proposed in the original contract. In other words, it was deemed a wiser expenditure of time and resources to take a microscopic, more in-depth approach to certain specific features of the problem, than to continue to deal in a macroscopic fashion with the total problem.

A number of alternatives were opened. For reasons which are delineated in more detail in the first chapter of this report, the decision was made to attack the problem of recruitment and of training for both specialist and non-specialist intermediate roles in research and development. Three possible directions for such efforts were available: training at the undergraduate level, non-specialist training at the graduate level, and in-service training. Two of these three directions have been explored up to the present time, namely undergraduate and non-specialist graduate training. The third direction, in-service training, will be pursued in the coming year. The first step involved the initiation of an undergraduate training program in the Fall of 1967. This program has been continued on an experimental basis and will be repeated in its fourth revision beginning in the Fall of 1970. In the Fall of 1968 an experimental graduate program was initiated and is being continued. Research and evaluation components have been pursued along with the development of these instructional programs.

From the foregoing discussion two conclusions are obvious. First, very substantial changes have been made in the nature of the original contract. Second, these changes have led to what in fact is an ongoing process of research, curriculum development and evaluation. The following report covers activities extending through the 1967-1968 academic year plus selected follow-up information through the Spring of 1970. Chapter I includes the problem and objectives as stated in the original proposal, followed by a delineation of the changes that have been made from the original contract. Chapter II contains a summary of the procedure used in compiling the Review of Research and includes a summary of the more pertinent elements of the review. Chapter III contains a description of the innovative undergraduate and graduate programs which have been developed since the Spring of 1967. Chapter IV contains evaluation data derived from the first experimental undergraduate group with which the project staff worked beginning in the Fall of 1967. Chapter V will provide a brief review of evaluation and research activities employed with subsequent experimental groups in the 1968-69 and 1969-70 academic years. A review of the implications of the programs and a brief presentation of their potential development are also included.

The authors of the report wish to acknowledge their sincere appreciation to all those persons who have been involved since the inception of the original proposal. First must be mentioned those graduate students who have been associated with the effort, including Irene Greenberg, Danford Hagan, Thomas John, Michael Mooney, and Joan Sessions. A number of individuals have played important roles as advisors and consultants to the project staff. Among these must be mentioned David Clark, Egon Guba, Ross Mooney, Arliss Roaden and Donald Sanders. Several members of the faculty of Educational Development have been involved in the experimental graduate program. These include: James Altschuld, Virgil Blanke, Desmond Cook, Charles Glatt, James Gunnell, John Kennedy, Howard Merriman, Edwin Novak, Joseph Sakumura, Donald Sanders, John Shea, Gregory Trzebiatowski, and Blaine Worthen. The authors wish to express their sincere gratitude to these individuals for their contributions. Particular thanks must be

expressed to James Altschuld and Joseph Sakumura who have been heavily involved in instructional activities and who have conducted evaluations of experimental groups during the 1968-69 and 1969-70 academic years. Their dedication to the task and their very thoughtful contributions to the design and implementation of the instructional experiences have been very important to the success of the experimental programs. Deep appreciation must also be expressed to June Myers and Charlotte Phillips whose untiring efforts have been indispensable to the successful production of the large quantity of teaching materials, reports, and other documents necessary to the experimental programs.

Finally, and in one sense most important, we must express our deepest appreciation to all those students who have participated in the programs. Their cooperation with the experimental instruction and their help in assessing its affect have been indispensable. This is particularly true of the undergraduates. Their youthful openmindedness toward an untested venture, their insightful criticisms, and their genuine enthusiasm for the domain were both challenging and sustaining. Above all, the undergraduates, by their very behavior, have proven the viability of the program concept and have reaffirmed our faith in the importance of empirical inquiry to the profession. The future of education lies in the hands of such as these.

Our experience with the undergraduates has demonstrated another vital proposition. Given a challenging instructional program with clearly applicable output for the futures of the students and, furthermore, given an instructional staff which genuinely cares for students and is willing to devote time to their individual development, undergraduates do respond with enthusiasm and with some real faith in the capacity of the established order to evolve. In short, there can be effective communication between the generations, a most crucial message in this time of deep alienation between the younger generation and the established adult order.

The content of the undergraduate program is particularly significant in relation to this latter point. Empirical inquiry, when justly utilized, is directed toward understanding the nature of reality, in short, to "telling it like it is" with respect to the universe in which we live. In this regard, two basic ingredients are: first, the generation of a maximally inclusive and unbiased perspective; and second, the generation of maximally unbiased information. Of further necessity to the utilization of scientific information is the unbiased dissemination of knowledge obtained. These are ingredients which are woefully missing in our contemporary professional crises. It is significant that young people can come to reaffirm their importance.

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CHAPTER I

PROBLEM

PROBLEM STATEMENT FROM THE ORIGINAL PROPOSAL

In recent years there has been a sharp increase in research in many fields of human knowledge. The field of education, however, has continued to exhibit a shortage of significant research. In view of the ever-increasing problems and pressures being confronted by educators, such a situation may be considered as critical.

One recent approach to this general problem has been through the development of the National Register of Educational Researchers (Guba and Bargar, 1963). This Register has been developed primarily to identify, for the first time, a national population of individuals engaged in research activity directly related to education, and to provide samples for subsequent studies of such individuals. Approximately 6,000 researchers have been identified and information obtained concerning personal vita, educational history, fields and sub-fields of professional identification, job histories, and areas of research activities. Data thus available from the Register may be cited to delineate those dimensions of the problem with which this proposal is concerned.

> Educational Background of Researchers. Returned questionnaires of 3,923 identified researchers have been included in a recent analysis of National Register Data. Thirty-six per cent of these individuals have received doctoral degrees granted from the field of education, 37% from the field of psychology, and 4% from sociology, with the remainder from a scattering of other fields. A comparison of the number of researchers receiving degrees in the twenty-year period from 1944-1963 with the number of degrees granted* from those fields during that time, reveals that the analysis group contains 5% of all doctorates granted in education, 12% of all doctorates granted in psychology, and 4% of those granted in sociology. Education being the highly complex human activity that it is, it may be considered natural that a

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*Data concerning granted degrees obtained from Index to American Doctoral Dissertations.

substantial proportion of the identified researcher population would come from allied fields such as sociology and psychology. The data presented above, however, strongly suggest that the profession of education has produced far too few researchers, particularly when viewed as the profession most vitally and directly concerned with the problems of education.

Professional Activities in Research. An examination of data relative to amount of time devoted to research, indicates that 88% of all respondents presently devote at least some time to research. However, the median amount of time devoted to research is only 25%, while only 3% of the group indicated 100% of time devoted to research. An examination of the present positions held by researchers indicates that less than 8% of the analysis group hold positions of employment in institutional units devoted entirely to research. These data strongly suggest that professional opportunities for research in the field of education have been limited.

Data presented above on educational background indicate that the orientation of graduate schools of education has not been such as to produce substantial numbers of researchers. The data on professional research activities indicate that once educational researchers are in their respective professional positions, the conditions under which they work are not conducive to research activity. Therefore, the purpose of this study will be to investigate educational and occupational factors (see illustrative list below) which influence educational researchers, and to determine the relationships of these factors to the training and nurture of educational researchers. Once these relationships are determined, it will be possible, through further research, to undertake an evaluation of present training programs and professional conditions for research, and to develop effective modes of action relative to the problem. The necessity for such action is underscored by expanding federal funding programs for educational research, and by the increasing need for qualified research personnel generated by such programs.

Factors relative to education and professional opportunities for research may be organized into two general sub-categories of classification: those factors relevant to the actual conditions under which training is received or under which research is conducted; and those factors relevant to the perceptions, attitudes, and values of the individual respondents. The following is a representative list of such factors:

Training Factors	Occupational Factors
Conditions: Formal program and courses Tutorial experiences Financial arrangements	Conditions: Distribution of assignments in present position Institutional support of research Research activities
Perceptions, Attitudes, Values: Relationships with advisor(s) Attitudes toward research as a career line Self-evaluation of program	Perceptions, Attitudes, Values: Professional identification Evaluation of adequacy of present position Perception of administrative attitudes toward research

The factors to be investigated will include both those related to activities, conditions, and circumstances involved in training and research, and those related to perceptions, attitudes, and values which individuals hold toward these activities, conditions, and circumstances.

OBJECTIVES FROM THE ORIGINAL PROPOSAL

1. The major objective of the study is to investigate educational and occupational factors which relate to the training and nurture of educational researchers. Sub-objectives of this primary objective are:

   a. to identify a preliminary list of factors which appear to influence the training and nurture of educational researchers; and

   b. to determine those factors on the preliminary list which do relate to the trainnng and nurture of educational researchers, and to determine the nature of the relationships involved.

2. The secondary objective of the proposal is to review and integrate presently existing knowledge about, or relevant to, the training and nurture of researchers in education. An integration of knowledge in this area will permit the development of long-range strategies for future research, and will greatly reduce the possibility of duplication of research efforts. This secondary objective grows naturally out of Sub-Objective 1.a., and may be accomplished with relatively little additional effort.

Brief Overview of the Study Relative to the Objectives. The major procedural steps through which the objectives will be fulfilled are as follows:

A. Foundational Phase of the Study

Sub-Objective 1.a. An initial list of factors to be investigated will be identified through an extensive review of previous studies and discussions relative to the training and nurture of researchers, both in education and in other fields.

Objective 2. The extensive review of literature relative to Sub-Objective 1.a. will provide a basis for integrating present knowledge about the training and nurture of researchers in education. Relative to Objective 2, a conference will be held during the summer of 1966 involving researchers now working in the area, other interested researchers, and consultants on methodology and research strategies. The primary purposes of the conference will be to permit (1) a summarization and discussion of research techniques, findings, and instrumentation used by researchers in this area; and (2) a discussion of long-range strategies for development of this area of research.

B. Investigatory Phase of the Study: National Survey Studies

Sub-Objective 1.b. National questionnaire studies will be conducted involving three groups of individuals directly related to the problem: doctoral students in educational research, doctoral advisors of these students, and practicing educational researchers. Relative to Sub-Objective 1.b., the factors being investigated will be related to levels of productivity of educational researchers involved in the survey. An analysis will also be undertaken involving data of individuals who have graduated from schools that (1) have been high producers or low producers of identified researchers, and (2) have contrasting types of graduate programs in educational research.

CHANGES IN THE ORIGINAL DESIGN OF THE PROJECT

From the foregoing description of the objectives and procedures from the original proposal it can be seen that the project would have provided the most comprehensive survey data available on a national scope concerning the problem of research training in education. Not only would the data have been more comprehensive than that provided by previous studies, but additional areas would have been explored that had not yet been dealt with. Once the project was initiated, however, it became clear that certain changes of direction would probably be necessary. Furthermore, as the initial phase of the study was completed, it became obvious that a major change in direction was desirable. These changes in direction will be discussed in some detail below.

The first step in altering the nature of the project was undertaken fairly early and pertained to the review of research. As originally conceived no immediate output beyond the project needs themselves had

been indicated. However, during the spring of 1966, Dr. Lee G. Burchinal, then Director of the Research Training and Dissemination Branch of the U.S. Office of Education, made a request of the project director that the review of research be focused into a report that could be used by the U.S. Office of Education, as well as by concerned professional groups around the country, in making policy decisions concerning research training programs. This request was in keeping with the interests of the project staff and was within the spirit of the originally proposed research and was thus agreed to. It meant, however, an expansion of the review as originally conceived, and meant that more time and resources would be devoted to this phase of the contract than originally proposed. The procedures employed in compiling the review of research and a summary of the review are provided in Chapter II.

The expanded review of research was essentially completed during the Fall of 1966, a little over one year after the beginning of the project. The perspective provided by the review of research made it clear that a major change in the remainder of the project was highly desirable. The primary factor in this decision was the realization that the data from already existing studies, when carefully integrated, did provide an adequate picture of the research training and research manpower problems in the field of education viewed from a national perspective. The study as originally designed would have provided more comprehensive data and would have filled in certain gaps in our knowledge base. But the expenditure of funds for this purpose did not seem justified in relationship to other crucial problems which emerged. During the Winter of 1967 alternative routes were explored. The one direction which seemed of prime importance and of prime interest to the project staff involved the exploration of innovative recruitment and training procedures which would attempt to speak to the critical manpower shortage which the profession has faced in the research and development arenas. The rationale behind this decision and the general framework within which the project would continue to operate were delineated in a paper prepared for the Administration of the College of Education early in the Spring of 1967. Relevant portions of this document are presented below.

It should be noted at this point that the Administration of the College of Education was clearly involved in the making of a final decision concerning alterations in the direction of the project. Institutional approval of the proposed changes was thereby obtained. Such approval was necessary not only because of the legal contract between the University and the Office of Education, but also because the proposed changes would initiate a long-range program of continuing research, curriculum development, and evaluation which would go far beyond the terms of the present contract and would demand certain commitments in terms of continued resources from the College. The present report covering Cooperative Research Project No. 3191 should thus be viewed as essentially being a progress report of a larger research and development

effort initiated through the impetus of the U.S. Office funds. The results of this continuing effort will have implications for the profession which will far outstretch the results which would have been obtained had the original contract been adhered to.

A Proposal for the Development and Testing of Research and Development Training Programs in the School of Education

Robert Bargar
May 12, 1967

Educational research and development training components have at least two major objectives in university settings: (1) The first of these objectives pertains to the training of personnel who will devote either full-time or some substantial portion of their time to research and development activities. While such persons might not have majored in research, they would have had some substantial contact with research, probably as a minor area, and would have developed some real commitment to research. (2) The second objective pertains to persons who essentially are practitioners, but who at the same time will have enough sophistication to enable them to function in relevant ways in research and development activities. This might mean the initiation or co-initiation and conducting of specific projects, or perhaps in more instances, some intelligent degree of cooperation in on-going R and D activities in their institutional settings.

Have schools of education generally been successful in meeting these objectives? Recent studies completed concerning research training in education indicate strongly that they have not. A major piece of evidence in this regard is the critical shortage of research and development manpower now being faced by the field of education. Specifically, with respect to objective (1) cited above, there are few qualified and well-trained researchers for the many research and development positions now open (Clark & Hopkins, 1966).

Recent research has brought to light certain institutional and programmatic variables which are highly associated with the capacity of schools of education to produce researchers (Bargar et al., 1965; Buswell, 1966; Heiss, 1966; Millikan, 1967; Lazarsfeld & Sieber, 1964; Sieber, 1966). Three major variables are: quality of input in terms of student ability; the existence of a well-integrated training program; and the existence of a favorable research climate, with particular emphasis upon opportunities for intensive research and development experiences and mature researcher-student interactions. By and large, schools of education have been found to be negligent with respect to these conditions.

Concerning input at the graduate level, recruitment practices apparently have not been adequate to attract sufficient numbers of high ability students (Berelson, 1960; Davis, 1964; Kidd, 1959; Moore et al., 1960); while at the same time some selection factors, specifically those pertaining to prior professional certificates or experience, bear a negative relationship to the production of researchers (Buswell, 1966; Sieber, 1966). With respect to the existence of integrated programs, it has been found that in most cases those research courses which are required or taught are scattered among various educational areas or among other academic departments of the university (Millikan, 1967; Sieber 1966). Under such circumstances students have little opportunity to develop adequate knowledge of or commitment to research and development. Concerning research climate, the situation in many schools of education is such as not to provide adequate experiences in research (Buswell, 1966; Millikan, 1967; Sieber, 1966). It would appear that even in bureaus of educational research, training opportunities have not been sufficiently utilized (Sieber, 1966). The impact of faculty upon the education of researchers has also been less than desired in most schools of education. The prevailing orientation of most faculties has apparently not been in the direction of research (Lazarsfeld & Sieber, 1964; Buswell, 1966; Sieber, 1966). Reported recruitment policies within most education specialities have favored persons with non-research rather than research orientations (Sieber, 1966).

Concerning the second major objective cited above, namely the production of practitioners who are literate concerning research and development, the manpower shortage may again be cited as a primary piece of evidence. By and large, school systems seem to be hard pressed to find members from their staffs who have enough knowledge and understanding of R and D to participate in Title III projects. Recent studies have not been particularly concerned with this aspect of professional training in education. Nevertheless, the evidence which exists suggests that the three major variables cited above may again be crucial. Regarding quality of input, the academic performance of education students, both at graduate and undergraduate levels, does not compare favorably with students in other fields (Berelson, 1960; Davis, 1964; Kidd, 1959; Moore et al., 1960). This is particularly true of undergraduate males, of whom the field of education contains a disproportionately smaller number in relation to other fields. It is the high-ability male, however, who has the greatest potential for completing graduate work at advanced levels (Davis, 1964). At the same time, Burnett and MacMinn (1966) have found that at least at OSU, approximately 65 percent of the graduating seniors in teacher education did not begin as freshmen, and that a substantial number leave sometime prior to completion of the program. This latter group may include high ability students who find the education program unfulfilling.

Generally speaking, education students also tend to be relatively weak in comparison with students from other fields in their motivation

for advanced study. Fewer plan to go on for graduate work, and of those who do the majority plan to go on at a later time rather than immediately upon receipt of the bachelor's degree (Davis, 1964). Yet, immediate pursuit of graduate work is highly associated with becoming productively and consistently involved in research (Berelson, 1960; Buswell, 1966). It has also been found that in comparison with students from other fields, students in education tend to come more from backgrounds in which occupational pursuits are stressed (Berelson, 1960; Brown, 1966; Brown & Slater, 1960; Davis, 1964) and are motivated more by practical rather than research occupational concerns (Brown, 1966). It thus appears that education, both at the undergraduate and graduate levels, tends to attract and retain students who are relatively low both in ability and in motivation for advanced studies and that these personal factors militate against the building of strong research interests.

Concerning training programs for the production of practitioners literate in research, education appears to be in no better position than with respect to the training of researchers or developers. Such programs would probably involve an R and D core concept. The general scattering of research courses among various educational areas and academic departments in universities would suggest that such core programs as may exist probably do not have sufficient integration to produce effective results in terms of student learning and commitment toward feasible research and development activities. Concerning research climate, schools of education appear to be particularly weak at the undergraduate level. It has been shown that having an undergraduate major in education is negatively related to becoming an educational researcher (Bargar et al., 1965; Buswell, 1966). It has been suggested that most undergraduate education courses deal with methodology and professional techniques and are designed to meet teacher certification requirements, rather than to stimulate an intellectual and creative interest in the field of education (Lazarsfeld & Sieber, 1964; Buswell, 1966).

The above discussion suggests that if the present research and development manpower shortage in the field of education is to be alleviated, then schools of education must undertake effective modes of action, not only in relation to the training of doctoral majors in research, but also with respect to the training of practitioners with adequate degrees of knowledge of and commitment toward research and development. In fact, the point could be substantiated that the existence of adequately prepared practitioners is equally important, and, over the long haul, perhaps more important than the training of full-time researchers and methodologists. This suggestion is based on the assumption that "Researchers" and "Developers" by themselves are not going to produce educational change. Change will take place only through cooperative efforts with concerned and committed practitioners. Such efforts will be possible only as practitioners are willing to evaluate their work, to articulate identifiable problems, and to move in relevant ways toward

effective action. At the same time, such practitioners will represent a natural and necessary group from which potential researchers and developers may be recruited. Educational researchers have in the past characteristically been recruited from allied social science fields, particularly psychology and sociology (Bargar et al., 1965; Heiss, 1966). Present and projected manpower demands now make this an impossible policy to pursue. These allied fields simply do not produce enough doctorates in total, let alone those who might be expected to develop some commitment to educational research. Education can no longer avoid the production of its own researchers, with the major recruitment pool being its own undergraduate and early graduate populations. Such a policy has been found to be characteristic of all other fields (Berelson, 1960; Clark, 1957). Education stands alone as a field which exercises a practice of borrowing the majority of its researchers and scholars from other disciplines.

To what extent are relevant actions being undertaken within the profession? On the national level, Title IV grants for the training of research and development personnel are designed to speak, though they do so inadequately, to objective (1). With respect to objective (2), however, efforts of national scope do not yet exist. One exception to this may come within the effort now being proposed by Guba, et al. of Indiana University. This activity, to be coordinated through the National Institute for the Study of Educational Change, will attempt first of all to identify training materials and approaches of various types which now exist or are in a state of development, and secondly to develop a proposal for the long-range study of research and development training in education. Through this effort it may be possible to identify existing practitioner-oriented training programs.

What might such a program or programs look like? The previous discussion suggests that such programs are necessary at both undergraduate and graduate levels (see Fig. 1). Although the general approach, depth of content, and time required might differ from level to level, the major purpose would be to enable practitioners to identify and articulate problems, and to use R and D knowledge in undertaking or initiating relevant modes of action. In order to accomplish this purpose, any specific program of this type should probably contain the three following emphases:

(1) The overall rationale behind research and development processes, with specific emphasis upon the functions and interrelations among various aspects of these processes;

(2) major technical or methodological alternatives, with specific focus upon application; and

(3) the cultivation of individual creative ability in the application of research and development knowledge to educational problems.

Figure 1. Projected Training Programs in Research and Development

Academic Program Levels	Programs for Research and Development Personnel	Practitioner Oriented Programs
Doctoral	Doctoral Major Doctoral Minor	Graduate Core (Doctoral Minor)
Master's	Master's Major	Graduate Core
Undergraduate	Undergraduate Major	Undergraduate Core
		In-Service Programs

In order to reflect these emphases, such a program would probably need to utilize (1) carefully delineated and sequenced content teaching material, (2) procedures and materials which emphasize the integration and application of content, and (3) individual and team creative experiences in research or development. This would suggest, among other things, the development of self-instructional methods, of individual and group techniques for achieving knowledge integration, and of procedures for the initiation and completion of actual research and development activities.

At the graduate level, such a program might require as much as a year to complete, and would probably involve new concepts in course design. Evidence suggests (Heiss, 1964) that for persons who are essentially novices in research, the more usual procedure of having separate courses in methods, statistics, or individual studies is not adequate for achieving a desirable quality and extent of integration among concepts, or intensity of creative experiences. A unified series of experiences spanning three quarters and more or less ignoring traditional quarter lines may be necessary. Also implicit is the development of more effective ways of utilizing faculty, teaching associates and educational technology. For example, the computer might be used in simulating prototype research and development situations within which students could exercise newly acquired research and development knowledge in an integrative and application-oriented fashion.

With what groups would such a program or programs be experimentally applicable? Practitioner preparation not only spans all academic levels but has increasingly come to involve the concept of in-service training which may or may not be related to the pursuit of formal degrees. Thus, such programs can be envisioned at several levels (see Fig. 1). These levels will probably be defined by critical groupings and sub-groupings among the student population, as well as by major student decision points. At the undergraduate level there appear to be several decision points that are critical. Burnette and MacMinn (1966) have identified three important sub-groups among undergraduate teacher education students at Ohio State. There are students who enter the program as freshman and who remain with the program through to its completion. However there is a very large number of students who leave the program prior to completion, and a correspondingly large number of students who transfer into teacher education from other departments or from other universities. As suggested earlier, those students who leave may well contain a substantial number of talented people who find undergraduate education programs incompatible with their ability and motivation toward inquiry. These same students might constitute a key group of potential scholars if their tendency toward intellectual and creative activity could be adequately nourished within the undergraduate program. Getting to these persons very early with some kind of program in scholarship or inquiry may be important in retaining their badly needed talent for the field of education.

The second major decision point in the development of undergraduate

students in teacher education probably comes during the late junior and senior year. At this point students are moving into advanced stages in their programs and, in particular, are approaching and engaging in their practice teaching experience. If integrated with practice teaching, a relevant research and development core program at this point could be productive of more mature levels of understanding for young teachers about to enter the profession. This understanding could pertain not only to an increased ability to use research and development knowledge in practice, but to teaching as an activity which can embody satisfying degrees of intellectual and creative endeavor. This should result in better practitioners as well as in the gradual emergence of persons who could move on for advanced training in research and development.

The early graduate level appears to correspond psychologically to the initial undergraduate level. While relevant data are not available, it may be that many able persons are drawn away from education during this period. A core program could be a critical experience at this point, and could probably be integrated without too much difficulty into the already existing requirements for both plan A and plan B for the master's degree. Such a core program could also be initiated at the doctoral level, and has apparently already been a matter of serious discussion for the Graduate Studies Committee of the College.

The last alternative, particularly as it relates to the field of educational evaluation, could be the initiation of an experimental in-service core program. Such a program could be initiated with an experimental group or groups of persons identified from within a given school system or systems. Such persons could be given training independently of, or in connection with, on-going Title III activities.

If viewed as a part of the research and development thrust of the School of Education, such programs could be developed, experimentally initiated, and evaluated both for their immediate effect upon students and for their long-range effect upon the subsequent career patterns of such students. The School of Education and any participating school system would thus be used as laboratories within which to conduct such research. While a cross-institutional approach might be utilized, greater control and precision may be possible if the initial thrust is focused on one institutional setting. Our School of Education is large and diverse, and is probably typical in many ways of other schools of education in large universities. Our faculty, students, and programs probably contain characteristics that represent fairly stable parameters. It thus seems appropriate to take a one-institution, laboratory-oriented approach.

Final Decisions Concerning Changes in the Project

From the foregoing discussion it may be seen that since the Spring of 1967 Cooperative Research Project No. 3191 has become a curriculum development effort in the area of research training. For the reasons delineated above these efforts have been focussed upon what is referred to as intermediate specialist and practitioner oriented training. The scope of such training could involve essentially three levels: undergraduate training, graduate introductory training, and in-service training. It was impossible, however, to undertake all three of these levels of activity simultaneously. The decision was made to begin the effort with an innovative undergraduate program. This level was chosen for the initial thrust because few efforts have been made to work with undergraduates in terms of research training and because of the great potential for recruitment into advanced research and development training and into professional activities in research and development which efforts at this level might produce. Thus an initial experiment with an undergraduate program was undertaken beginning in the Fall, 1967. This program was revised and a second experiment initiated in the Fall of 1968. A third experiment is being conducted beginning in the Fall of 1970. During the Fall of 1968 the second level of potential practitioner training was explored; namely, that of introductory training at the graduate level available to all graduate students in education and involving a core curriculum concept. This program is being revised and repeated. During the coming academic year efforts will be made to design and eventually implement selected in-service programs primarily directed at teachers. All of the programs which have been initiated under this effort have been evaluated systematically and have had correlated research efforts.

A great deal of data have been generated through the continuing research and evaluation efforts surrounding the experimental programs. Evaluation designs have involved both immediate, as well as longitudinal, assessment activities. It is thus difficult to present a complete picture of the effects of the programs on any given group of students until some extensive time has elapsed. The first experimental group began its activities in the Fall of 1967. All of these students will have graduated as of June, 1970. Many of them are now in the field employed in various positions or have entered more advanced studies. It is thus possible with this first group to gain some picture of not only the immediate impact of the program but also to gain some flavor of the longitudinal effects. The evaluation data from this first group will be presented in Chapter IV. Data from the subsequent experimental groups is still being compiled and will be made available to the professional community through later reports. A description of the subsequent evaluation activities and a discussion of future developments of the programs are provided in Chapter V.

CHAPTER II

REVIEW OF RESEARCH RELATED TO RESEARCH TRAINING IN EDUCATION

SUMMARY OF PROCEDURES USED IN COMPILING THE REVIEW

As initially conceived in the original contract proposal, the Review of Research was to deal primarily with studies in Education dealing directly with Research Training or with related topics in the general area of graduate education. After its redesign the area covered was expanded to include topics that would be relevant to the general arena of research training but which did not necessarily fall within the area of graduate training in the field of education. These studies could be classified in three major categories: first, those which are concerned directly with research training in education or with various characteristics of graduate programs in schools of education; secondly, those which deal with research training in fields other than education; and thirdly, those concerned with certain aspects of higher education that may have important implications for research training in education. These studies are described in additional detail in the Introduction to the review which is presented in the following section of this chapter.

Initially, approximately 500 different references were identified across these three general categories of sources. These were culled with the result that approximately 150 studies were then obtained and extensively abstracted. These sources were found to be of two types: position papers and papers reporting studies in which data were collected. The primary concern was with the second type, namely those sources which reported data from empirical studies. The information from these sources was incorporated into the main body of the review. The position papers were also abstracted and the major concepts from these papers were also integrated.

The general procedures used in compiling information from this study were as follows. First, each source was comprehensively abstracted. Secondly, the major variables or factors dealt with in each study were listed. These factors were then copied onto index cards with a code referring to the studies from which they came. The index cards were then integrated according to the factors or variables which they contained so that the studies dealing with common factors could easily be identified. The number of discrete variables covered

in the many studies abstracted was quite large. It was therefore essential that some over-all model or index of topics be generated as a major framework within which the information could be indicated. Such a general model was developed around the general concept of research career development. This model is presented in the following section of this chapter (see figure 2 , page 19). The chapters of the review are organized around the major concepts implicit in this model. A brief description of these chapters is provided in the next section.

An auxiliary activity which was very important in the compilation and structuring of the review developed out of what had initially been designed in the original proposal as a conference which was to deal with major policy issues concerning research training in the profession. It was decided that the resources originally designated for such a conference should be channeled into a series of sessions involving those individuals who had recently conducted research on research training. These persons were to serve several functions in accomplishing the creation of the review. First, they were to act as an advisory committee on relevant sources, and particularly to provide data from their own studies which had not been reported but which might be of importance in the total picture. Secondly, they helped in the formulation of the general model which was then used as the basis for the writing of the chapters of the review. This group consisted of the following persons: Dr. Sam Sieber, Dr. David Wilder, and Mrs. Nancy Millikan of the Bureau of Applied Social Research at Columbia University; Dr. Ann Heiss of the Center for the Study of Higher Education at the University of California at Berkeley; and Dr. John Hopkins, Dr. David Clark and Dr. Egon Guba of the University of Indiana. The generous help of these persons was a very important factor in the formulation of the Review.

PRESENT STATUS OF THE REVIEW

The initial draft of the Review was completed by the Spring of 1967. This draft was duplicated and was submitted to Dr. Lee G. Burchinal in the U.S. Office of Education as a report in accordance with Dr. Burchinal's original request. Plans for publication of the review were also formulated at that time. Because of the extensive efforts required to initiate the experimental training programs being developed since that time, publication plans have been somewhat delayed. However, the content of the review chapters has been kept up to date by the inclusion of information from research completed since the Spring of 1967 and a final draft for purposes of publication is now being prepared. The general design of this publication is outlined in the following section which includes the Introduction from the Review.

INTRODUCTION TO THE REVIEW

One of the many serious problems now facing the field of education concerns the demonstrated shortage (Clark and Hopkins, 1967) of professional personnel with adequate training in research skills. Concern for the problem stems from the growing realization that we do not have solutions to many of the educational problems which we face and that a major route to finding solutions to these problems lies in a multifaceted utilization of inquiry techniques in the investigation of educational behavior and in the development, evaluation, and improvement of educational practices. Without an adequate supply of inquiry talent, however, this route will be impossible to pursue in any systematic and effective way. Therein lies the rub, for considerable evidence exists to indicate that institutions of higher learning have, for many years, steadfastly failed to provide adequate training in research skills at any academic level for persons moving toward careers in education. The need for such persons has grown rapidly as a result of greatly increased federal funding, particularly through the Elementary and Secondary Education Act of 1965, with the shortage now so critical that the success of many new programs will undoubtedly be adversely affected.

In response to this concern there has been increased activity generally throughout the profession with respect to research training, including federal support for doctoral trainees through Title IV of ESEA. However, these efforts appear to be clearly inadequate. Clark and Hopkins (1969) have indicated that even with presently renewed efforts at research training, including Title IV, the output will be critically short of projected needs. At the same time, increased training activity or increased funding per se are probably not in themselves satisfactory responses to the problem. Quantity is not the only question involved. There is some evidence that existing training models and routes, including those presently being supported by the U.S. Office of Education, are not adequate; that "more of the same thing" will not necessarily produce the full spectrum of personnel needed; nor will it produce the enriched vocabulary of skills essential within the total research, development, and evaluation arena in education. These considerations suggest that existing training patterns may not be sufficient, and that sharper changes in these patterns within Schools of Education and other educational institutions are demanded.

If changes from existing patterns are necessitated, then the issue arises as to what shape these changes should take. This issue in turn raises a host of questions concerning the nature of research skills and of the many individual, institutional, and social characteristics which influence their development. Knowledge concerning these questions becomes crucial in making necessary decisions about changes in research training per se or in establishing support policies for research training at various institutional and governmental levels.

In response to the need for an adequate knowledge base, a comprehensive review of studies and position papers pertaining to the training of research personnel in education and related fields was undertaken by the authors through a grant from the USOE. The primary objective of this review is to provide a propositional integration which would have immediate policy and administrative value for the institutionalization or evaluation of research training programs. Thus, as indicated above, the review was generated by the need to base attempts to develop potential research (R) and development (D) talent upon valid assertions about the relationship of aspects of academic settings and programs to post-academic research and development output. It is hoped that the review will also provide the basis for the identification of questions concerning what we need to know about training for R and D careers in education, as well as the projection of feasible research strategies in relation to these questions.

The purpose of this publication is to make the major trends of knowledge uncovered through the review available to a wide range of persons concerned with issues surrounding the training of R & D skills. A complete reprinting of the findings is available through a companion publication* and will be of interest to those who are intent upon conducting research in this area or who have direct responsibility for designing training programs or for developing institutional and governmental support policies for research training.

In addition to a summary of findings, this publication will also provide a discussion of the implications of these findings, a summary of research strategies with a projection of future research strategies, and a discussion of future directions for research training.

The sources which have been reviewed, including a few pertinent position papers, tend to fall into three groups. The first group consists of those studies which are concerned directly with research training in education or with various characteristics of graduate programs in schools of education. As such, they constitute the most relevant set of sources available.

The second group consists of studies dealing with research training in fields other than education. These studies provide data which, while not always directly applicable to education, are nonetheless highly related and include factors which are associated with research productivity or creativity, as well as the prediction of careers in scientific

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* Still in preparation.

research, or the recruitment, selection, and training of researchers in general.

The third group consists of studies concerned with certain aspects of higher education that may have important implications for research training in education. Several of these studies deal with the relationship of the college environment to college productivity and the plans or aspirations of students, while other studies provide general descriptions of factors influencing plans to pursue graduate study and the current status of graduate education in general.

Soon after the review was begun, it became apparent that a great deal of relevant data was available. It was obvious that too many discrete variables taken by themselves could defeat the objective of reporting the findings of many studies in some meaningful context. It was considered necessary therefore to review the relevant data under rather broad constructs--constructs assumed to bear some relationship, directly or indirectly, to final dependent variables such as professional research orientation or activities. These constructs are indicated in the general theoretical model (Figure 2) developed as a basis for organizing and presenting the data. This model represents an integrated approach, involving both personal and educational environment factors considered relevant to educational vocational decisions. The approach is basically developmental in that role commitment and consequent educational-vocational decisions are assumed to be influenced by a combination of factors in time. Thus, the model provides a framework for examining the results of studies which vary in their inclusion of the total career development process.

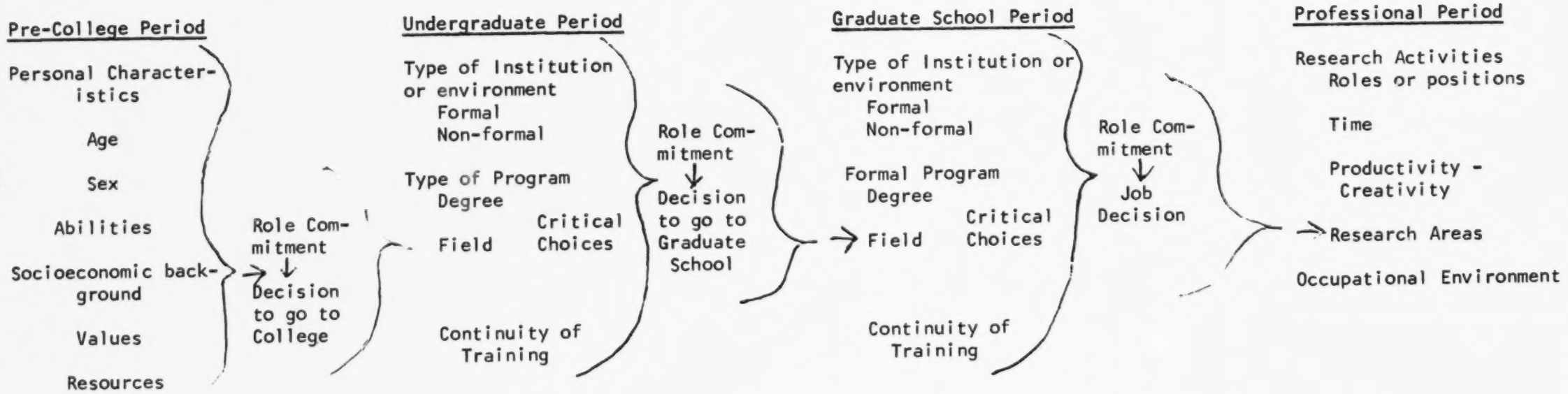
Chapter I deals with the production of researchers by schools of education. Emphasis is given to selectivity factors, such as student selection and faculty recruitment, and to institutional environment, with particular emphasis upon research climate. Several descriptive institutional variables are also discussed--geographic location, institutional size, and type of institutional control.

The focus of Chapter II is on findings pertaining to research outcomes of doctoral study in education, including degree differences in professional research orientation. Various aspects of the doctoral training program are examined--existence of specialized training for research, research and non-research course offerings, apprenticeship experiences, and the dissertation. Attention is also devoted to undergraduate and master's training in education, and to training for creative research.

Chapter III examines the continuity of doctoral study. Consideration is first given to the length of time taken to complete doctoral study in education, with focus on full-time versus part-time, and continuous versus discontinuous study. In the context, age at receipt

Figure 2

Theoretical Model of Research
Career Development



of the doctorate is also examined. The remainder of the chapter is devoted to an examination of some pertinent causes of undue length of doctoral study--financial resources of doctoral students, professional experience and the teaching certificate, the language requirement, the dissertation, and military obligations.

Chapter IV reviews several variables classified as inputs which potentially relate to research productivity via developmental channels. Included under background are socioeconomic status, home environment, religion, geographic origin (including rural-urban differences), and personality variables including intellectual and non-intellectual factors.

Chapter V is devoted to a discussion of the methodologies employed in the studies included in the review. Consideration is given to (1) the frequency of type of studies or methodologies, (2) the typical techniques or procedures used across studies, and (3) the techniques or procedures characteristic of each type of study. Finally, the important question of future research strategies is discussed.

Chapter VI, provides brief statements of implications for research training in education.

A BRIEF SUMMARY OF THE REVIEW

by Corahann Okorodudu
February, 1968

I. The Critical Shortage of R and D Personnel

To begin with, the review presents rather impressive evidence of the inadequate production of R and D personnel by schools of education. Over the past several years, only about 5 percent of the doctoral recipients in education per year have entered positions having a 50 percent or more research time commitment (Millikan, 1967; Sieber, 1966). Only 12 percent of them have published two or more research studies within ten years after their degree (Buswell, 1966) -- which is also evidence of their relatively low impact upon the educational change process. Again, only 15 percent of the existing population of educational researchers (less than half of whom were trained in education) devote as much as 50 percent of their time to research (Bargar et al., 1965). Moreover, a current projection estimates suggest that by 1972 there will be a demand for 130,000 primary researchers and developers, although approximately only 10 percent of that number will be available (Clark and Hopkins, 1966).

All these facts point to the need to consider antecedent factors, with the view of providing increasingly effective solutions. This summary focuses upon some of these factors, such as institutional context

and training provisions of schools of education, which appear to operate interactionally to affect the production of researchers.[1]

II. Institutional Contextual Factors

How adequate are schools of education as settings for the training of inquirers for the profession? This question is answerable in terms of evidence concerning two contextual factors -- selectivity and environment.

Institutional Selectivity

Institutional selectivity is probably the most critical antecedent in the production of primary researchers, the effectiveness of other contextual factors depending chiefly on the high selectivity of recruits (Millikan, 1967; Sieber, 1966). Yet in terms of recruitment from the undergraduate population at least, education has tended to attract recruits that are lower than recruits to most other fields on ability, on motivation to pursue graduate study immediately and continuously, and particularly on research career aspirations (Davis, 1964; Kidd, 1959). Indeed, undergraduate specialization in education is negatively related to research productivity (Bargar, et al., 1965; Buswell, 1966), a trend which is not characteristic across fields (Clark, 1957). This negative relationship probably results not only from the relatively low quality of recruits to undergraduate education generally, but also from the "professional" nature of undergraduate education courses which treat education as a mere collection of techniques rather than an area of inquiry (Buswell, 1966; Lazarsfeld & Sieber, 1964).

At the master's level, two current bases of institutional selectivity -- professional experience or teaching certificate requirements -- appear to be negatively associated with the development of researchers (Buswell, 1966; Millikan, 1967; Sieber, 1966).

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[1] Considerable coverage is also given in the review to several background factors classifiable as inputs which relate to research productivity via developmental channels. These factors include personality, socioeconomic status, religion, and geographic origin. Although these antecedents are less manipulable, they should be considered both in the recruitment of potential R and D talent and in the provisions of a climate of creative nurturance for their fullest development.

Therefore, there is clearly a need to revise and go beyond current selection procedures employed by schools of education in order to identify, actively recruit, and select individuals with high potential for training at all levels. The production of inquirers to meet the overall demands of educational development cannot be achieved simply by curricular innovations or allowing trainees to identify or select themselves. Also, the practice of reliance upon sporadic, chance recruitment from related fields is no longer defensible.

What are the recruitable pools?

(1) An available but relatively unexplored area of potential recruits is the undergraduate education population. In spite of the general lack of inquiry and low quality of recruits at the undergraduate level, there are several reasons for considering education undergraduates as a primary source of recruits: (a) Education undergraduates have constituted the largest source of recruits to graduate research training programs in the past; (b) individuals majoring in education can be expected to have more of a primary commitment to the solution of educational problems than persons majoring in other fields; (c) finally, and perhaps most important, the negative association between majoring in education at the undergraduate level and future research orientation need not exist if inquiry and practice are viewed as mutually supportive rather than diametrically opposed processes.

(2) A recent preliminary educational career pattern analysis (Worthen) has identified public school teachers as the second most viable existing pool for continuous, long-range recruitment. It was found that "public school teacher" was the most frequent initial position of current researchers in education.

(3) A third, largely unexplored, area of available recruits is the female population (Davis, 1964; Bargar et al., 1965; Brown, 1966; Wilder, 1966; Worthen), and I assure you that this fact is not indicated here merely in self-defense. It has been indicated (Davis, 1964) that most women are destined for marriage rather than long-term careers; therefore, a realistic estimate of fully committed professional talent may be the proportion of high-ability males. In comparison with other fields, education tends to attract a low proportion of high-ability males and a high proportion of high-ability females, few of whom anticipate or actually pursue careers in research or development.

Once viable pools are identified and actively recruited on a competitive basis, findings concerning intellectual and non-intellectual characteristics could provide some initial basis of selection. In general, these findings reflect substantial agreement that beyond a certain base level of intellectual capacity, which may vary across

fields, orientation toward science or research is crucially determined by other personality factors (Brandwein, 1955; Cattell, 1963; Cooley, 1963; Mackinnon, 1962; Roe, 1953). Although intellectual and non-intellectual characteristics can serve generally as useful indicators of research potential, nonetheless there is evidence that a broad rather than a stereotype conception of research personalities is required. Educational inquiry is so diverse in nature (as attested by existing and emerging roles) that it tends to attract individuals of varying intellectual and non-intellectual dispositions (Heiss, 1966).

Institutional Environment

Although institutional selectivity is a primary predictor in the production of researchers, it does not appear to account for all of the variation in institutional productivity. Evidence found lends to the conclusion that the environment or climate of schools of education is an important secondary predictor of the production of educational researchers and developers. Studies dealing with this variable show that researchers are produced by graduate schools which provide a strong research climate. Indications are that among the various indices examined thus far, institutional research quality and emphasis are the most basic environmental antecedents in the production of researchers (Heiss, 1966; Millikan, 1967; Sieber, 1966). Unfortunately, a comparison of lists across studies reveals that overall institutional quality and the quality of research produced bear a low relationship to the quantity of education doctors produced and only a moderate relationship to the quantity of educational researchers produced by schools of education. Moreover, there appears to be a low relationship between the production of education doctors in general and the production of educational researchers (see Tables I and II).

Since the indices of a strong research climate suggest that faculty recruitment is the most integral component of institutional environment, the question may be posed, Are school of education professors adequate models for educational inquiry?[1] Most of the evidence uncovered thus far is negative in this regard.

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[1] This question is a partial focus of a paper being prepared by the author entitled "Are College of Education Professors Adequate Professional Career Models?"

TABLE I

PER CENTS OF AGREEMENT BETWEEN LISTS OF INSTITUTIONS (TOP TEN PER LIST) RATED AS HIGHEST PRODUCERS OF RESEARCHERS OR DOCTORATES AND LISTS OF INSTITUTIONS RATED ON OVERALL QUALITY OR QUALITY OF EDUCATIONAL RESEARCH PRODUCED

	MOORE: Education Doctorates (1956-1958)	BUSWELL: Educational Researchers with Doctorates in Education (1954)	BARGAR: Educational Researchers with Doctorates Across All Fields (1952-1961)	BERELSON: Doctorates Across All Fields (1957-1958)
KENISTON:				
Overall institutional quality	30	50	60	70
SIEBER:				
Quality of Research produced in education	40	50	70	80

TABLE II

PER CENTS OF AGREEMENT BETWEEN LISTS OF INSTITUTIONS (TOP TEN PER LIST) RATED AS HIGHEST PRODUCERS OF RESEARCHERS OR DOCTORATES

	MOORE: Education Doctorates (1956-1958)	BERELSON: Doctorates Across All Fields (1957-1958)
Buswell:		
Educational researchers with doctorates in education (1954)	40	70
Bargar:		
Educational researchers with doctorates across all fields (1952-1961)	50	90

(1) Most schools of education prefer and recruit more teaching than research professors, although this trend is reversed among those schools rated highly for the quality of their research. Moreover, the vast majority of students in education are enrolled in subfields -- the so-called "professional" as distinguished from "academic" areas -- where emphasis is placed primarily upon the recruitment of professors competent in teaching rather than in research (Sieber, 1966).

(2) Faculty are mainly responsible for the secondary position of research in most schools of education. It is usually the dean who ranks research above teaching or service, while the faculty least often assign highest priority to research (Sieber, 1966). Schools characteristic of this trend cannot provide a healthy climate for research. Being largely negative toward the importance of inquiry, the faculty can hardly be expected to be effective molders of research interest or competence which they themselves lack.

(3) It is logical to expect, both on the basis of model identification as well as formal training provisions, that faculty influence may be minimized further by the high student-faculty ratios of most schools of education (Brown, 1966; Brown & Slater, 1960; Heiss, 1966; Moore et al., 1960; Sibley, 1948). There are at least three implications of high student-faculty ratios: First, faculty in these schools may be hired for teaching which becomes their primary commitment; second, heavy teaching loads minimize their personal involvement in research; third, high student-faculty ratios also reduce both the rate and affective quality of student-faculty interaction.

III. Program Provisions

Degree Differences in Professional Research Orientation

Although Ph.D. programs are somewhat more productive of researchers than Ed.D. programs (Millikan, 1967; Sieber, 1966; Wilder, 1966), this difference is not as consistent as one might expect on the basis of the stated objectives of the two degrees. On the one hand, a larger proportion of Ph.D.'s than Ed.D.'s engage in research activities and produce research publications in the post-doctoral years (Buswell, 1966; Wilder, 1966). Also, a higher proportion of Ph.D.'s than Ed.D.'s become major researchers who devote a considerable amount of their professional time to research (Bargar, et al., 1965; Brown, 1966; Millikan, 1967). On the other hand, researchers in the two degree groups do not differ on average number of research publications per person. Also, the Ed.D.'s appear to actually exceed the Ph.D.'s in research productivity before age 32 (Buswell, 1966).

The Existence of Specialized Research Training Programs

Few schools of education have specialized research training programs or emphasize research, although there has been a substantial increase in the number of these programs due to recent federal legislation (Krathwohl, 1965; Millikan, 1967, Sieber, 1966). Common characteristics of specialized doctoral research training programs and the major differences found between these programs and research training provided within regular degree programs are discussed in the review. Certainly evidence of the variability in existing and emerging inquiry roles in education leads one to question the efficacy of programs specialized strictly in terms of research. There may be a need for inquiry training, broadly conceived, which is differentiated not only in terms of levels but also in terms of types of required role competencies.

Research Courses

There is a scarcity of research or development courses in schools of education, the most common pattern of requirements being general methods together with statistics (Krathwohl, 1965; Moore et al., 1960; Sieber, 1966).

Disagreement exists concerning the overall quality of research courses taken in education. At the graduate level, research courses taken in education appear to be unrelated to the production of primary researchers; while, by contrast, research courses taken in non-education departments do appear to contribute somewhat to the development of a research orientation (Millikan, 1967). The largely ineffectual nature of research courses in education is hardly surprising in view of the fact that few education faculty are interested or competent in research. However, ineffectual research courses may reflect both the low quality of concepts or techniques provided as well as the lack of knowledge of the applicability of these concepts or techniques to the analysis and solution of educational problems (Heiss, 1964). What seems to be required, therefore, is a greater degree of integration of knowledge concerning educational contexts, within which problems arise, and methodological or technical solution strategies.

In the absence of more direct measures (i.e., aside from retrospective perceptions) it is logical to expect that the adequacy of research courses in education varies directly with the overall quality and research environment of graduate institutions of education and the universities of which they are a part.

Apprenticeships

In contrast to findings pertaining to courses, opportunities for apprenticeship experiences appear to be positively associated with the production of educational researchers (Buswell, 1966; Sieber, 1966). The effects of research apprenticeships may be due mainly to actual research experiences provided, while the positive relationship of teaching assistantships may be due more to high student selectivity.

Although education is lower than other fields in opportunities for assistantships, there is under-utilization of even those opportunities which are available (Sieber, 1966; Moore et al., 1960). Among other factors, lack of attractiveness of educational research to many students, their unfamiliarity with research tools, and their lack of awareness of existing and emerging role demands and norms in educational inquiry probably contribute to this trend.

The Dissertation

Apparently, no attempt has been made to relate the dissertation experience to later research productivity in education or in other fields. However, evidence concerning the influence of research reports written during the period of graduate study (Buswell, 1966) suggests that research dissertations in general may eventuate in research careers. In the review attention is focused upon the extent to which the dissertation in education is in fact a research training experience. Findings presented show that a rather large proportion of doctoral dissertations in education are not really research studies. Contrary to expectations, there are relatively few differences between Ed.D.'s and Ph.D.'s in the types of research methods they employ, these few differences being partly dependent upon the subfields in which their degrees are granted. (Knoell, 1966)

Duration

Studies of the duration of doctoral study across fields concur that the length of time taken to achieve the doctoral degree is negatively related to future research productivity. No matter what index of research productivity is used, the longer the period of doctoral study, the less likely the possibility of an individual becoming involved primarily in research (Berelson, 1960; Buswell, 1966). Education doctors take the least amount of time to complete their programs when the criterion is number of years of full-time, continuous study. However, they actually take much longer than doctors in most fields when the criteria are (1) elapsed time between receiving the bachelor's degree and receiving the doctorate, (2) elapsed time between entering graduate study and

receiving the doctorate, or (3) elapsed time between admission to doctoral study and receipt of the doctorate. Consequently, education majors comprise the oldest age group across fields upon receipt of the doctorate, and are less likely to become productive researchers (Buswell, 1966). The average age of doctors in education has remained fairly stable over the years (38.8 in 1954--Buswell; 38-39 between 1956 and 1958--Brown & Slater, 1960; and approximately 38 in 1964--Brown, 1966). Significant correlates of duration of doctoral study--such as inadequate financial resources, the dissertation, professional experience, or certificate requirements--were discussed.

Training for creative inquiry

Training for creative inquiry beyond research or development competencies per se also requires some consideration. Experimental studies and specific educational programs strongly suggest that creative behavior can be developed at any age under certain optimal conditions. Education has not emphasized or adequately incorporated principles of creative development either in undergraduate and graduate programs generally, or in research training programs. This condition need not persist in view of interventionistic studies which have successfully induced creativity and positive research attitudes, at least at the undergraduate level. Personality data also suggest the need for schools of education to do more to nourish non-intellectual characteristics in training potential inquirers for education at all levels.

The following general proposition is derivable from the trends which I have attempted to present: The setting or ecology of an educational institution determines its structure and climate. These, in turn, set parameters for training, which involve both the attraction and recruitment of talent as well as provisions for the inculcation of knowledge, skills, and values. It is probable that the production of inquirers is affected little by one or another aspect or type of training program. Indeed, the total institutional atmosphere may be the effective agent.

CHAPTER III

DESIGNS OF THE EXPERIMENTAL PROGRAMS

This report will provide evaluation information from the first undergraduate experimental group. Before presenting this information in the following chapter, it is first necessary to describe the undergraduate program as it has evolved over that period of time. This same period of time has also witnessed the development of the graduate Introduction to Inquiry sequence. The design of the graduate program is closely related to the undergraduate program and will be described in order that the reader may have a further picture of the developmental efforts that have been underway. Official documents relative to the approval of these instructional programs within the College of Education at The Ohio State University have been prepared. These documents provide the most accurate description of the rationale, objectives and design of the program and are thus most appropriate for presentation of the program in the context of this report.

PROPOSAL FOR AN INSTRUCTIONAL PROGRAM IN EDUCATIONAL DEVELOPMENT FOR UNDERGRADUATES

By Robert Bargar
January, 1970

Background

During the summer of 1967 a proposal for a pilot program in Educational Research and Development (R & D) for talented undergraduates was approved by the College of Education and by the Council on Instruction of the University. This pilot program represented an initial attempt to determine to what extent undergraduates would be interested in training in Educational R & D and to what extent they would be successful in such training. The proposal for this program was one outgrowth of research efforts supported by two successive USOE grants (Bargar, 1963, 1965) that had been underway in the college since 1963.

During the first year, 1967-68, approximately 20 students completed the pilot program. The success encountered in working with these students led to the decision to continue the program for at least one more year 1968-69. During this second experimental year 15 students completed their first year of the program, while students from the first group completed their second year of the program. By March of 1969, it became obvious that the program would remain a success and that it should be continued as a permanent part of the College curriculum. However, it was deemed necessary to explore further the relationship between this program and the new graduate Introduction to Inquiry sequence that was being developed. As a result, a third experimental year (1969-70) for the undergraduate program was requested.

At the present time approximately 25 students are enrolled in the program as first year students.

Rationale for the Establishment of the Program

The concern for research training in education which emerged in the early 1960's was a result of many factors. Primary among these factors was the considerable increase in support of R & D activities in the profession, primarily as a result of increased federal funding. This increased support prompted a correspondingly sharp increase in demand for qualified trained personnel. However, there simply were not sufficient numbers of trained personnel to occupy the many positions opening up. Clark and Hopkins provided, from 1966 through 1969, various estimates of the shortage which faced the field. While their later estimates of manpower needs were considerably less than those originally generated in 1966, these projections were nonetheless several times over the estimated production of researchers by schools and colleges of education.

A Review of Research produced by Bargar, Okorodudu and associates (1967) identified a number of factors related to the training of researchers in education. Several of these are particularly important in relationship to undergraduate training. First, it was clear that new recruitment pools had to be identified in order to ultimately close the manpower gap. Educational researchers have traditionally been recruited from other Social Science fields and the size of the demand indicated that this simply was no longer possible as a policy. Undergraduate students in the colleges of education represent by far the largest and potentially most significant pool from which to recruit persons into R & D training.

Secondly, certain characteristics of graduate students and graduate training also support the viability of undergraduate R & D training. Findings by Frymier (1959), Clark (1957) and Roe (1953) suggest that contact with research as a potential career at an early age is an important factor related to the production of quality researchers. In the field of Education in particular, such factors as age and prior professional interests militate against the development of strong commitment to the initiation of or participation in research on the part of a large majority of graduate students. This is not to say that an increased emphasis on research training at the graduate level will not result in a larger number of persons developing commitment toward the importance of R & D. What is stressed, however, is that this approach will be inadequate ultimately in meeting not only the demands for numbers of researchers but, more important, the demand for quality researchers.

Several factors connected with undergraduate training in education also support the feasibility of the proposed new program. First, there seems to be some evidence to indicate that bright talented undergraduates do leave the College of Education primarily because they lack sufficient interest in teaching as a full-time career line. These students may

nonetheless retain a commitment to education and, if offered an alternative career route at the undergraduate level, it might be possible to retain their talents so badly needed in the profession. It can be noted here that some students presently completing the research minor do appear to follow this pattern.

Secondly, our experience with the program during these first two years does indicate that there are sufficient numbers of undergraduates interested in and committed to the importance of research such as to warrant the establishment of the proposed program. Last spring, over 70 students indicated an interest in the program by attending an interview session, even though only approximately 40 could be placed in the program.

Furthermore, and perhaps most important, our limited experience with students who are in the program, as well as those who have completed the program, clearly indicates that jobs are available for individuals with the level of skill and academic training which we are providing. Graduates of the program are now employed full-time in research and evaluation operations. At the same time, we have little difficulty in placing students presently in the program in part-time positions as research assistants on campus.

Objectives

The general objectives of the program are as follows:

I. Knowledge Objectives

1. To provide students with an overview of (a) the nature of inquiry, (b) existing modes of inquiry, (c) the relationship of inquiry to practice, and (d) types of inquiry activities in education.

2. To provide basic knowledge of empirical methods and tools relevant to the solution of problems in education. This objective includes knowledge of problem conceptualization, research strategies, design, sampling, measurement, and statistical procedures.

II. Application and Interpretation Objectives

1. To provide a meaningful integration among conceptual, design, measurement, and statistical aspects of research through the evaluation of empirical reports in terms of explicit methodological criteria.

2. To provide the ability to interpret educational data and make valid inferences from them.

3. To provide skill in the application of empirical methods and tools to educational problems. This objective

includes both application to specific educational problems or tasks and application within individualized project experiences.

III. Orientation Objectives -- concerned with developing both an awareness of inquiry functions in education and commitment to inquiry as a guide to educational practice.

1. To provide a basic awareness of graduate programs and the expanding range of occupational opportunities for educational inquiry including the following: research in school settings, development, evaluation, etc.

2. To increase the orientation of students toward future training in inquiry.

3. To increase commitment to educational inquiry in terms of aspirations for future involvement.

4. To increase positive attitudes toward inquiry, both as a generally valid and a personally viable approach to the solution of educational problems.

Student Output

Several outcomes in terms of immediate benefits to the students are expected from the program.

1. Immediate Graduate Work in Research. A major expectancy of the program is that a relatively high proportion of the students would plan to continue their studies toward an eventual career in research by immediately entering Graduate School. The training provided in this program would put them well along the way toward gaining basic competency in methodology which is so essential to fruitful advanced work. Many graduate students majoring in research now have to go through a period of what is essentially remedial training in basic research methods before entering into more advanced considerations which ought to be the domain of graduate work.

2. Employment Upon Graduation. Many types of research roles which have emerged over the last 6 to 8 years do not require doctoral level training. These roles may be found not only within R & D laboratories but also, and more particularly, within large school systems which more and more are establishing evaluation and research departments. Our experience with recent graduates of the program indicates that such jobs are available and that our students qualify for them. A survey recently completed (Barga- and Hagan, 1969) of such positions

available in school systems in the State of Ohio indicates that jobs are available not only in the Columbus area but in other large metropolitan school districts.

3. Graduate Work in Other Professional Areas. It is anticipated that some students completing the program may not shift their major professional direction into full-time R & D but may well continue training in a related professional area. The background in research methods obtained through this program will be a valuable asset to them as they pursue graduate work. They will be in a position to engage immediately in significant research and scholarly work as graduate students without the period of remedial training in research.

4. Teaching. Some students completing the program clearly intend to enter immediately upon a teaching career. These students have taken the program primarily because of their commitment to the concept of research even though in some cases a formal minor was not necessary for completion of their undergraduate program in teacher education. They anticipate that the skills which they develope through this program will be useful to them as classroom teachers in a variety of ways, particularly in terms of classroom testing and evaluation of their own activity as classroom teachers.

Program Design

Preparatory to discussing the program as it is to be set up, it will be advantageous to first very briefly review the structure of the program during its first three experimental years. In total, the program has operated within the framework of 30 credit hours, a requirement of all minor programs in the College. Initially, the 30-hour block of time was divided into two segments, the first consisting of 18 hours of coursework and seminars taken consecutively through one academic year of three quarters, and the second consisting of twelve hours of work focused on individual studies, internship experiences or elective courses related to research. The initial 18-hour block of time has been handled similarly across the three years with two exceptions: (1). After the first year the undergraduates took their lectures during the first two quarters on basic research methods and statistics with graduate students who were enrolled in the new two-quarter Introduction to Inquiry sequence. This approach, which has proved to be successful, has resulted in a substantial saving of staff time. While merged with the graduate students for lecture experiences, however, the undergraduates have independent seminars concurrent with the lectures. (2). After the first year, an advanced seminar covering two quarters was added during the second year of the program, reducing to ten hours the amount of time devoted to internship experiences and electives.

The first experimental group devoted most of its remaining 12 hours to elective courses. This was found to be a less than desirable policy because it did not permit adequate focus on the development of basic skills and understanding. The succeeding two groups have therefore devoted most of their remaining 12 hours to internship experiences. Care has been taken on the part of the program staff in establishing intern relationships which would maximize student growth and independent work. In many cases the students have also been able to combine the internship experience with employment as a research assistant. Generally this change in policy has been highly successful from the student's standpoint. When given a chance to participate in actual research and to make some real contribution to that research they tend to develop higher levels of commitment.

Figure 3 contains an outline of the program proposed as a permanent part of the undergraduate curriculum. This outline incorporates changes which have proven to be successful over the past two years and essentially represents the design of the program employed with this year's group (1969-70). A brief quarter-by-quarter review of the program will provide some insight into the details of the student's activities.

Autumn Quarter, First Year. During the first quarter of the program the students take their lectures with the graduate students enrolled in Inquiry I. This course provides a basic introduction to research methods including problem conceptualization, non-experimental and experimental design, sampling and measurement. Accompanying the lectures the students also participate in undergraduate seminars. The major focus of these seminars is the development of individual research proposals. The seminars also provide opportunities to clarify concepts presented in the lectures and to develop skills in abstracting and critiquing research literature. Two new numbers are being proposed for the undergraduates for these courses. These numbers would be repeatable throughout each quarter of the first year.

Winter Quarter, First Year. During the second quarter of the program the undergraduates take lectures on elementary statistics with graduate students enrolled in the second quarter of the Introduction to Inquiry sequence. Accompanying the lectures the undergraduates also attend seminars designed to provide opportunities for discussion of lecture concepts, discussion of applications of statistical techniques and experience in the computation of statistical problems.

Spring Quarter, First Year. During the third quarter of the program students engage in what is basically a workshop experience in measurement, evaluation and data processing. Their essential actitity consists of working in teams to develop, administer and analyze data from various types of instruments.

FIGURE 3

Undergraduate Minor in Educational Development

Program	1st Year Autumn	1st Year Winter	1st Year Spring	2nd Year Autumn	2nd Year Winter	2nd Year Spring
Research & Development Course sequence: (20 hrs.)						
Lectures	Educ.5AA* 3 hrs.	Educ.5AA 3 hrs.	Educ.5AA 3 hrs.			
Seminars & individual conferences	Educ.5AB* 3	Educ.5AB 3	Educ.5AB 3	Educ.6AA 1 hr.	Educ.6AA 1 hr.	
Individualized Research & Development Experience: Internship (10 hrs.)				Educ.7AA** 3 hrs.	Educ.7AA 3 hrs.	Educ.7AA 4 hrs.
	6	6	6	4	4	4

Total = 30 hrs.

*Repeatable up to nine hrs.

**Repeatable up to twelve hrs.

Autumn Quarter, Second Year. During the first quarter of the second year, students are engaged generally in two types of activities: (1). an advanced seminar in research methods which continues through the Winter Quarter. (2). Internship work with an ongoing project or individual member of the faculty. In some instances individual students might be enrolled instead in relevant elective courses. It should be noted here, that the second year of the program is more flexible than the first in terms of activities. Generally, most students prefer to devote the remainder of the program to meaningful internship experiences. However, some selected electives can be an important adjunct to their training. Regarding the internship, students typically continue these experiences over the three quarters of the second academic year of the program. However, many variations to this pattern do occur. Some students find it advantageous to conduct their internship entirely within the space of one quarter, in a fashion somewhat similar to student teaching. In other instances students prefer to take larger amounts of internship credit over a two-quarter span.

Winter Quarter, Second Year. The Winter Quarter again for most students will consist of two activities. The first will be a continuation of the advanced research seminar. The second, in most cases, would consist of research internship experiences.

Spring Quarter, Second Year. The Spring Quarter would bring the termination of the program for most students. The advanced seminar will not be conducted during the Spring Quarter. Electives or internship experiences would be the only remaining element of student activity. It is being recommended that two new course numbers be approved for use during the second year. The first would be an advanced seminar number, the second a general number repeatable up to 12 hours for internship work.

Several final comments can be made concerning the internship experience. In some ways this has proved to be one of the most successful aspects of the program. As indicated above, substantial attempts are made by the program staff to assure adequate placement of students in meaningful experiences. The students themselves have been well received and their work highly regarded. Groups both within and outside of the College are now taking steps to make systematic use of our students during their internship experiences. Within the College, for example, arrangements have been made to place students with the Test Development Center within the Faculty of Educational Development. Outside the College, a proposal is now being prepared by individuals in the area of Medical Education Research to obtain funds for the regular employment of our students both during their internship and beyond. Similar contacts have been made at the Office of Evaluation and Planning in the State Department of Education and with the Department of Evaluation and Research of the Columbus Board of Education. Of course,

students will continue to be placed with individual professors or projects within the University setting.

Recruitment of Students

In the past the program has been conceived of basically as a select specialist program. Students have been accepted into the program only after invitation and following a successful interview with the program staff. Three criteria have been used in selecting students for the program: grade point average of 2.8 and above, percentile ranking of 70 or above on some section or total score of the ACT, indicated interest and commitment to research as a potential career as evidenced through an interview. At the present time we propose to continue our previous method of recruitment. However, we would like to explore the possibility of other avenues such as nomination by faculty advisor, or recruitment from other special college programs, etc. As a result of this decision the program will be available only by permission from the program staff. The new courses to be listed eventually in the bulletin will be available to students only through permission of the instructor.

PROPOSAL FOR A GRADUATE SEQUENCE:
INTRODUCTION TO INQUIRY

Robert Bargar
March, 1969

Program Mission

This program has been developed in response to a College-wide need to increase the quality of preparation of graduate students in inquiry and to increase the efficiency with which this preparation may be provided. It is intended to be of large enough capacity by 1969/70 to provide a two-quarter course sequence to 200 graduate students per year and to expand as demand requires and as resources are made available.

The program is expected to achieve objectives which are not possible in our present program:

(1) To include a broader perspective of research in education than the traditional experimental, psychological approaches implied in the past by the term "educational research." In addition to experimental research techniques, historical, sociological, economic, and anthropological approaches to the study of educational problems will be included. This will be made possible through a team-teaching approach.

(2) To relate inquiry and research strategies and techniques operationally to educational problems in the real world of schooling. Particularly, to concentrate on those problems calling for effective inquiry modes which derive from changes in the social context in which educational systems operate.

(3) To develop to a usable operational level in each student the necessary inquiry skills and attitudes to make research an integral

part of their professional equipment. This will be possible through a procedure involving extensive tutorial and small group activities.

(4) To serve as a foundation on which advanced study of research methods, problems, and findings can be built by other Faculties in their own specialities. This should permit more efficient use of research specialists on those Faculties and permit them to provide students with much higher levels of knowledge and skill. In turn, the whole program should increase the efficiency with which these students can prepare dissertations.

The cultivation of inquiry skills in professional educators is necessary for educational development and thus is essential to the mission of the Faculty of Educational Development. As we conceive it, development of educational systems requires intensive effort by persons in a variety of roles in school systems. Specialists in the general processes of educational development (evaluation, planning, etc.) are necessary but they cannot be sufficient to this effort. Development and research efforts on a team or individual basis by persons in administrative, curriculum and other roles are required. Preparation in this inquiry program hopefully will contribute to this capacity of graduates from all Faculties in our College.

Functions and Objectives

As presently envisioned, the program will serve two functions. First, it is designed to provide graduate students who are not specializing in educational development with basic training that will be relevant to their prospective professional roles and to the needs of their graduate work. At the same time, the program will serve as a beginning sequence in inquiry methods for those students who intend to specialize as majors or minors, but who have had no previous coursework or experience in educational development.

The overall purposes of the program are to stimulate positive attitudes toward inquiry and to provide a functioning level of skill in the use of inquiry skills. The objectives of the program are listed in Chart A.

CHART A

INTRODUCTION TO INQUIRY: OBJECTIVES

I. Knowledge

1. To provide students with knowledge of (a) the nature of inquiry, (b) existing modes of inquiry, and (c) types of inquiry strategies, such that they will be able to identify appropriate modes or strategies for given problems.

2. To provide students with knowledge of problem conceptualization, such that they will be able to identify and conceptualize a problem of interest to them.

3. To provide students with knowledge of empirical methods and tools, such that they will be able to

   a. identify alternative methods or tools that could be used for given problems,

   b. identify questions or principles that must be considered in making decisions concerning specific methods or tools,

   c. identify appropriate sources of consultative help when needed, and

   d. carry out the basic operations involved.

II. Application and Interpretation

1. To develop in students a meaningful integration among conceptual, design, measurement, and statistical aspects of research through the evaluation of empirical reports in terms of explicit methodological criteria.

2. To develop in students the ability to interpret educational data and make valid inferences from them.

3. To develop in students skill in the application of empirical methods and tools to educational problems through the writing of research proposals and, when possible, through involvement in individual or team projects.

III. Orientation

1. To increase positive attitudes of students toward inquiry, both as a generally valid and personally viable approach to the solution of educational problems.

CHART A (CONT.)

2. To increase commitment of students to educational inquiry in terms of aspirations for future involvement.

3. To increase the orientation of students toward future training in inquiry.

Program Design 1969-1970

1st Sequence	Autumn 1969	Winter 1970	Spring 1970
Lectures	Educ. 785 5 hours 2-2 hour classes per week	Educ. 786 5 hours 2-2 hour classes per week	
Seminars	1-2 hour seminar per week	1-2 hour seminar per week	Educ.925.-- 2-4 hours

2nd Sequence	Spring 1970	Summer 1970	Autumn 1970
Lectures	Educ. 785 5 hours 2-2 hour classes per week	Educ. 786 5 hours 2-2 hour classes per week	
Seminars	1-2 hour seminar per week	1-2 hour seminar per week	Educ.925.-- 2-4 hours

It is proposed that the Introduction to Inquiry consist of an integrated two-quarter sequence with an optional third-quarter seminar. The first two quarters would consist of lectures designed as knowledge acquisition experiences, and seminars designed as knowledge integration and application experiences. Team teaching will be a feature of the lectures. Chart B contains a content outline of the first two quarters.

It is recommended that the optional third quarter be oriented toward further integration and application, and that it consist of seminars conducted primarily by members of other Education Faculties for the benefit of their students enrolled in the initial two-quarter Introduction to Inquiry sequence. The major objective of this procedure would be to foster maximum applicability and relevancy of research and development concepts and methodologies to problems germain to the student's own areas of specialization. In order to accomplish this objective, it will be essential that members of other Faculties, who themselves are specialists in these areas and who are most familiar with the idiosyncratic problems of these areas, take the major role in organizing seminar experiences. The Educational Development faculty will, when requested and when resources are available, assist in the conducting of these seminars, but will not take responsibility for initiating such seminars, other than one to be offered for students specializing in educational research and development.

CHART B

INTRODUCTION TO INQUIRY

Content Outline

1969-1970

1st Quarter: Autumn & Spring

A. Lectures

1. Nature of Inquiry
2. Historical Method
3. Non-Experimental Design
4. Experimental Design
5. Measurement and Data Processing

B. Seminars

1. Problem Conceptualization
2. Writing Research Proposals
3. Abstracting and Discussing Research Literature

2nd Quarter: Winter & Summer

A. Lectures

1. Descriptive Statistics
2. Correlation
3. Probability and Hypothesis Testing
4. Non-Parametric Techniques
5. Analysis of Variance

B. Seminars

1. Statistical Computation
2. Discussion of Analysis Techniques in Research Literature

There are several important advantages to this recommendation. First, it would permit a more beneficial setting for integrative discussions than would be possible if this objective were forced into the preceding quarters. Second, it would provide a basis for realistic interaction between the Development Faculty and other Faculties of the College. The lack of such interaction was a distinct disadvantage to previous R & D units and organizational structures of the College. It has also been a serious handicap to graduate students, who have been subjected to conflicting value systems with respect to the function of inquiry, and who have been forced to forage for themselves in obtaining whatever degree of integration they could between the worlds of research and practice.

It will be assumed that students will enroll for both of the first two quarters, and will not be permitted to enroll for any succeeding quarter without having had the preceding experiences or equivalents thereof. Present plans call for the scheduling of two sections, one in the early afternoon for resident graduate students, and one in the late afternoon for the considerably larger number of non-resident students. Each section would hold two 2-hour lecture sessions and one 2-hour seminar per week during Autumn and Winter Quarters. It is felt that such an arrangement would provide for a maximum of instructional efficiency. This pattern will be repeated again in the Spring and Summer Quarters, thus providing alternative times during which the sequence may be elected during the year. Chart C presents actual schedules for the Spring and Summer quarters of 1969 showing how the lectures and seminars are used in pacing the coverage of topics.

With respect to the coverage of topics, the emphasis will be upon providing students with what may be described as a "conceptual" level of knowledge concerning a wide range of techniques applicable to educational settings. The intent is that students have a broad background from which to select possible approaches to a given problem, but that they also understand when to seek help, if necessary, in making final decisions or in the execution of given operations. They will thus have sufficient knowledge of the domain of research methods to be able to exercise independence of thought concerning the nature of the problem and the inquiry routes which they could utilize, but would not have in-depth expertise in given techniques. This is viewed as an appropriate goal for students at this level. Greater depth of understanding as well as greater breadth of familiarity with techniques would require additional work in advanced courses.

In line with this rationale, the lectures will focus primarily upon the logical basis, typical uses and limitations, and an overview of the basic operations of each technique. Specific operational or computational skills will be developed for those most-used techniques. Because of the number of techniques to be covered in this fashion, the program will be intensive in nature. It is recommended that five hours of credit be granted for each of the two quarters of work.

CHART C
Spring Quarter, 1969

Weeks	Mon. - Lectures	Wed. - Lectures	Fri. - Seminars
1st		Mar. 26 Testing	28 Nature of Knowledge: Perception
2nd	31 Nature of Knowledge: Perception	Apr. 2 Inquiry Models	4 Problem Conceptualization
3rd	7 Historiography	9 Review of Empirical Strategies	11 Proposal Writing; Problem Statements
4th	14 Non Experimental Design: a. Sampling	16 b. Surveys Demography	18 Discussion of Sample Proposals
5th	21 c. Ex post facto-Relational studies	d. Developmental & case studies	25 Discussion of Literature
6th	28 Exam	30 Experimental Design	May 2 Discussion of Student Abstracts
7th	5 Experimental Design	7 Experimental Design	9 Discussion of Student Abstracts
8th	12 Experimental Design	14 Measurement a. Basic Concepts & Philosophical Issues	16 Discussion of Student Proposals
9th	19 b. Questionnaires, Interviews, Observation	21 c. Objective Tests	23 Discussion of Student Proposals

CHART C (CONT.)

Weeks	Mon. - Lectures	Wed. - Lectures	Fri. - Seminars
10th	26 d. Scalar Techniques	28 Data Processing & Analysis: Preview Quantitative Methods	

SUMMER QUARTER, 1969

Weeks	Mon. - Lecture	Wed. - Lecture	Fri. - Seminar
1st		June 18 Introduction: Frequency Distributions, Graphs	20 Operating Desk Calculators
2nd	23 Central Tendency	25 Variability	27 Discussion of Descriptive Techniques
3rd	30 Standard Scores Normal Curve	July 2 Correlation	4 Holiday
4th	7 Correlation	9 Correlation	11 Discussion of Correlation Studies
5th	14 Regression	16 Reliability, Validity Item Analysis	18 Discussion of Regression Studies
6th	21 Exam	23 Probability	25 Sampling
7th	28 Hypothesis Testing	30 Hypothesis Testing	Aug. 1 Discussion of Inferential Studies

CHART C (CONT.)

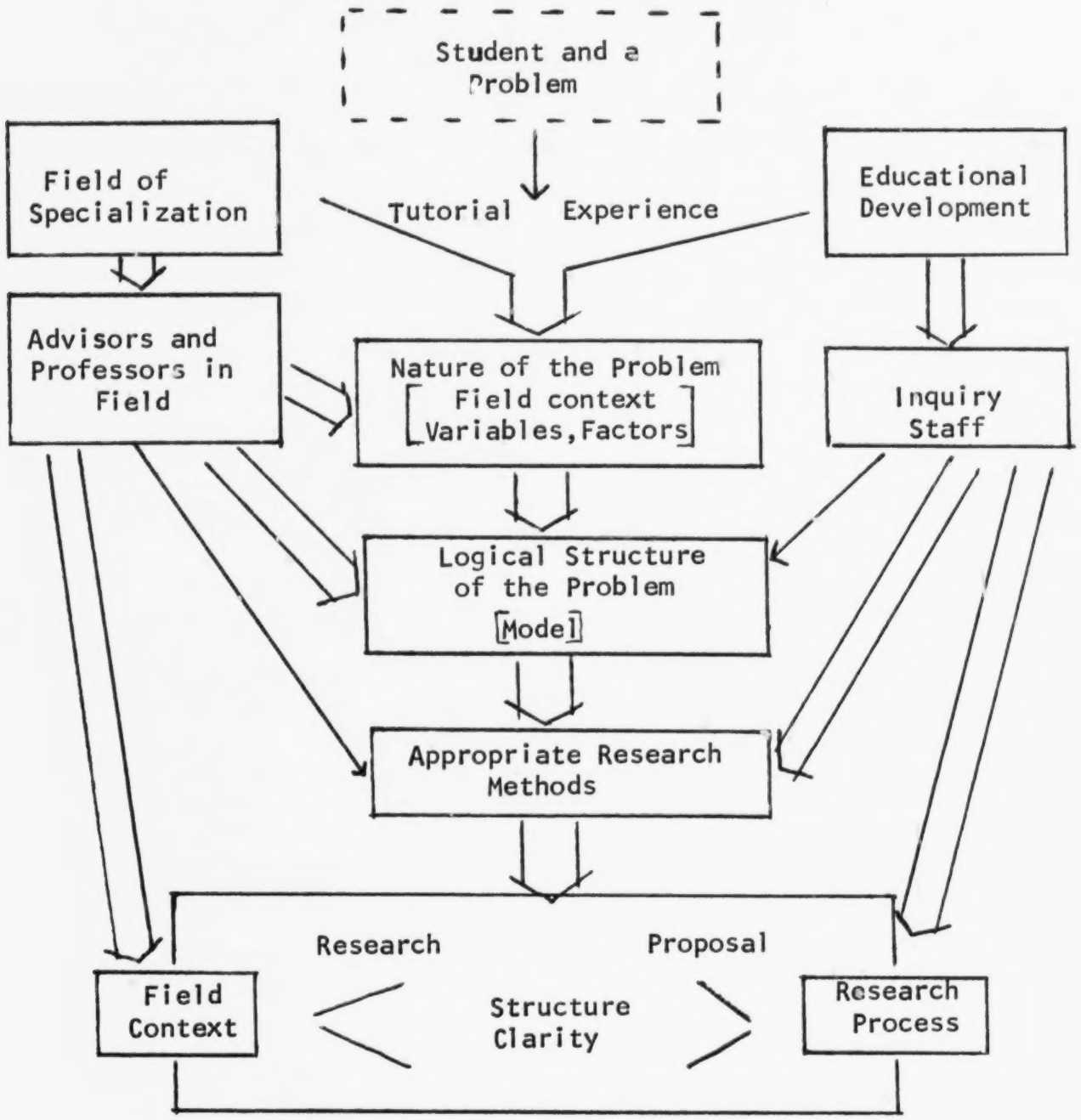
Weeks	Mon. - Lectures	Wed. - Lectures	Fri. - Seminars
8th	4 Hypothesis Testing	6 Non-Parametric Techniques	8 Discussion of Inferential Studies
9th	11 Non-Parametric Techniques	13 Analysis of Variance	15 Discussion of Inferential Studies
10th	18 Analysis of Variance	20 Analysis of Variance	22 Discussion of Inferential Studies
11th	25 Analysis of Variance	Exam	

Proposal Development

The writing of a research proposal is considered to be one of the most important aspects of the first quarter of the program, for it is in this experience that the students will attempt to use the concepts being learned in designing research in a topic of interest to them. Most students require individual help at various points in the process of developing a proposal, and having such help accessible at the right time becomes a crucial issue in the success of this aspect of the program. Most important, such help is needed not only with respect to the research methodology but also with the initial conceptualization of the problem. In fact, this latter aspect of the process may be considered to be of prime importance, for any decisions made concerning methods are based upon the conceptual frame of reference generated for viewing the problem, whether implicit or explicit. It is thus important that students receive adequate counsel, when needed, concerning both the nature of the problem within its particular professional context, and the methodologies appropriate to it.

Members of the Faculty of Educational Development involved in the program are qualified to provide counsel on questions of methodology, but in most instances will not be able to provide adequate counsel concerning the nature of the problem, since students will come into the program from a wide variety of professional backgrounds. It will therefore be important that students have access to persons in their professional areas for necessary counsel on the nature of the problems they have selected. This suggests, then, that individual help for proposal development will have to come both from the program staff and from other Faculties of the College. Cooperative support of this nature is deemed vital to the development of the students. Chart D presents a rationale for the interlocking role of the program staff and other faculties for various aspects of the proposal development process. It is recommended that viable procedures be established for the obtaining of needed counsel beyond the program staff.

CHART D
Sources of Counsel for Proposal Development



Note: Double arrow lines indicate a primary source of counsel; single lines a secondary source.

CHAPTER IV

EVALUATION OF THE FIRST UNDERGRADUATE EXPERIMENTAL GROUP (1967-1970)

This chapter contains the following evaluation information: (1) procedures and results of the first year of the undergraduate program; (2) anecdotal data concerning employment of students in research, development or evaluation; and (3) a survey of school personnel to determine the viability of the undergraduate program.

PROCEDURES AND RESULTS: FIRST YEAR OF THE PROGRAM (1967-68)

Design of the Evaluation Study

One experimental group and two comparison groups were employed in the evaluation. Each group received a pretest and, following an eight-month period (three quarters) during which the experimental group took the research-development program (experimental treatment), a posttest. Students within each group were self-selected and therefore preexperimental sampling equivalence was absent. In experimental design language this may be referred to as a non-equivalent comparison group quasi-experimental design (Campbell and Stanley, 1966). Pictorially this design may be represented by

$$\begin{array}{ccc} O & X & O \\ O & - & O \\ O & & O, \end{array}$$

where the first O represents the pretest; the X stands for the experimental treatment; the second O represents the posttest; and the broken lines indicate the non-equivalent nature of the three groups.

A statistical technique often used to examine the effect of the experimental treatment with the above design is covariance analysis, where significant concomitant variables are statistically controlled and an F computed on the remaining variance (Campbell and Stanley, 1966). Based on the results of the covariance analysis, an explanation of significant differences among groups with respect to the dependent variable(s) is then attributed to the experimental treatment in a cause-effect relationship. However, since there are a large number of conditions that must be satisfied when using analysis of covariance, its use is greatly restricted (Winer, 1962; Campbell and Stanley, 1966; Evans and Anastasic, 1968). Even if statistical significance were obtained in the hypothesized direction, it would be difficult to justify a causal relationship because of the many uncontrolled sources of internal and external invalidity inherent in a design of this nature (Campbell and Stanley, 1966). Also, by statistically controlling for significant concomitant variables, much important information is lost concerning the relationship of these concomitant variables to the dependent or criterion variables.

For the above reasons it was decided to abandon the traditional use of the quasi-experimental design and resultant statistical analysis. Instead, a correlational design was employed with stepwise regression as the principle method of data analysis. This design and statistical technique permitted an examination of the relationship of being in each of the three groups, as well as other identified predictor variables, to each of the dependent variables. Experimental and comparison groups were now treated as discrete pseudo variables which entered each stepwise regression analysis without being subject to the many conditions found in the quasi-experimental design and covariance analysis.

The pictorial representation of the correlational design employed in this study now becomes

A	B	C
1	0	0
0	1	0
0	0	1

,

where Column A represents Membership in the Experimental Group (1) and not in either of the other two groups (0); Column B represents Membership in the Not Interested Comparison Group (1) and not in either of the other two groups (0); Column C represents Membership in the Interested 1968 Comparison Group (1) and not in either of the other two groups (0); and each column represents a separate discrete predictor variable entered in each stepwise regression analysis.

Identification, Recruitment, and Selection of the Samples

Student files were examined to obtain a list of undergraduate education students who had obtained a 2.80 or higher pre-professional cumulative quarter hour grade point average, and who had completed between 45 and 135 quarter hours of course work. Originally it had been planned to take, in addition, only those students who had placed in the 70th or higher percentile on the Verbal and/or Quantitative sections of the American College Test, but since this would have drastically reduced the number of otherwise qualified students it was discarded. A total of 487 undergraduate education students, defined as talented, were identified by this procedure.

A letter was sent to each of the 487 identified students announcing the establishment of a fully accredited non-teaching minor degree program in educational research-development beginning Autumn Quarter 1967. Information was given about the nature of the program and reasons why talented students might benefit by taking it. A brief questionnaire dealing with various degrees of interest in the program and stamped return envelope were included.

By the end of three weeks, 299 students (61.5 per cent) had responded to this initial recruitment letter. The breakdown of responses was as follows: 83 students indicated an interest in taking the program beginning Autumn Quarter 1967; 61 students expressed an interest in taking the program the following academic year; 80 students replied that they were not at all interested in the program; and 109 students said they were interested in the program but could not take it due to other program commitments.

A second letter was sent to the 83 students who expressed an interest in enrolling in the program Autumn Quarter 1967, explaining more about the research-development minor. Guidelines were included to aid these students with their decisions to enroll in the program; and a similar questionnaire and stamped return envelope were included at the end of the letter. By the end of two weeks, 72 students (87 per cent) had responded to this second recruitment letter; 38 students still said they wished to enroll in the program Autumn Quarter 1967.

The 38 students who were recruited for the research-development program by this method represented 7.8 per cent of the total identified sample (487) and 21.1 per cent of those students who responded to the first and second recruitment letters (288). A larger percentage of students indicated an interest in taking the program the following academic year (12.4 per cent of the total identified sample and 21.1 per cent of those students who responded to both recruitment letters). Combining students who indicated an interest in starting the program at once and the following academic year with students who said they were interested in the program but could not take it due to other program commitments, it was observed that 45.5 per cent of the total identified sample and 72.1 per cent of the students responding to both recruitment letters indicated a positive interest in a program of this nature.

Due to the small number of students who were definitely interested in beginning the program Autumn Quarter 1967, it was necessary to select all of them. The use of random assignment to experimental and control groups was therefore discarded, which weakened the possibility of explaining any results on the basis of causal relationships. A third letter was sent to these 38 students notifying them that they had been selected for enrollment in the program. Five students did not sign up for the program; two students dropped out after the first class; one student was dropped from the analysis because he had been working with the investigator and was familiar with the study; and one student was recruited via another source. This left a total of 31 students who actually enrolled in the research-development program during Autumn Quarter 1967.

Since the research-development program was more than three consecutive quarters, it was expected that there would be a high dropout rate. This expectation was confirmed; three students dropped the program at the end of Autumn Quarter, and seven students dropped at

the end of Winter Quarter (after being exposed to statistics). The final experimental group included the 21 students who completed three consecutive quarters of the research-development program.

In order that students in the experimental group be kept as naive as possible concerning the nature of the study, during the first class they were notified that at the request of Dean Cyphert, Associate Dean of Instruction and Research, College of Education, The Ohio State University, they had been selected to take part in an evaluation activity being conducted by the College of Education in order to revise and upgrade the undergraduate teacher education curriculum. At the end of pretesting, each student received a letter from Dean Cyphert expressing his gratitude for their participation in the evaluation activity, and informing them about the second half of the activity (posttesting) to be completed during Spring Quarter 1968. At the end of Spring Quarter 1968, all students in the experimental group took posttesting in the same room with students from the comparison groups. Whether or not this procedure actually kept the experimental group naive concerning the nature of the study is debatable.

Two comparison groups were included in the investigation. They were identified from students' responses to the first recruitment letter, and consisted of the 80 students who replied that they were not at all interested in the program (not interested group) and the 61 students who expressed an interest in enrolling in the program the following academic year (interested 1968 group). A letter signed by Dean Cyphert was sent to students in both comparison groups informing them about a curriculum revision study currently being conducted in the College of Education, and asking them to participate in an evaluation activity in conjunction with this study. A brief questionnaire concerning their interest and the time and place of this activity were included on a stamped return postcard.

Of the 80 students in the not-interested group, 51 (63.8 per cent) responded to this letter; and of the 61 students in the interested 1968 group, 38 (62.3 per cent) responded to the letter. Telephone calls were made to each of the students in both comparison groups who responded positively to the letter prior to pretesting, reminding them of the time and place of the evaluation activity. Seventeen students in the not-interested group and 20 students in the interested 1968 group were recruited for pretesting. Shortly after completing pretesting, a letter signed by Dean Cyphert was sent to all participants expressing his gratitude for their interest in the evaluation activity and informing them about the second half of the study (posttesting) to be completed at the end of Spring Quarter 1968.

During Spring Quarter 1968, another letter signed by Dean Cyphert was sent to students in both comparison groups who completed pretesting, indicating the necessity of finishing the second half of the evaluation activity so that the final analysis could be done. Three testing dates were included and students were informed that if they could not make any

of these dates, individual sessions would be provided. Fifteen students in the not-interested group and 15 students in the interested 1968 group completed posttesting (mortality rate of two and five students, respectively, between the two testing periods); these students were included in the analysis.

Instrument Development

A fairly exhaustive search of the literature indicated the lack of ready-made instruments that adequately measured any of the dependent variables in this investigation. Therefore, instruments had to be developed. This section presents a brief discussion concerning the development of these instruments.

Inquiry Orientation. The instrument used to measure inquiry orientation (research-development attitudes) was developed by Dr. C. Okorodudu, formerly on the faculty of the College of Education, The Ohio State University. Although a variety of valid and reliable cognitive and general personality measures was available, none of them appeared to measure research-development attitudes directly. Hence it was decided to construct a scale that would differentiate among individuals and subgroups in education in terms of their generalized potential for research-development roles in the field. An additional requirement was that such a scale, supplemented by one or more related measures, could be used on a pretest-posttest basis as one index of the extent of change in attitudes associated with research-development training programs in education.

The basic theoretical position regarding the nature and structure of attitudes as conceptualized in this study was derived from Katz and Stotland (1959). An attitude is defined as an individual's tendency or predisposition to evaluate an object or the symbol of an object by the attribution of qualities that can be placed along a dimension of desirability-undesirability. The basic structure of an attitude is thus largely determined by the effective or evaluative component, although the behavioral component and at least a minimal cognitive component increases the accuracy of predicting behavior from the expression of attitudes. It follows therefore that any assessment of attitude should include more than the measurement of affectivity and evaluation. The belief and behavioral components, and the linkage of the attitude to its motivational bases and value system should be measured as well.

The affective component refers to positive or negative feelings associated with an object. These feelings are subject to arousal by presentation of the stimulus object or its symbol(s). The behavioral component contains positive or negative action tendencies toward the object of the attitude. The cognitive component contains knowledge or beliefs about the object, and these knowledge or beliefs tend to reinforce one's attitudes concerning the object.

Research-development attitudes may arise from any of several motivational bases, e.g., the need to understand the world, the need to maintain order in the world, ego-instrumental or ego-defensive needs. From such origins, they function as intervening variables that may be expressed in favorable expressions or evaluations of research-development. In the context of this investigation, inquiry orientation was assumed to be an integral part of one's general system of intellectual values and dispositions. However, even though inquiry orientation was considered to be part of such a system or related psychological systems, it was assumed here to be identifiable and thus measured separately.

The Inquiry Orientation Scale was constructed according to Likert's method of summated ratings (Likert, 1932). This method was selected because it had been shown to be less laborious than other scaling techniques while being highly correlated with them. According to this method, subjects are asked to place themselves on a five-point continuum with respect to positive and negative statements (strongly agree, agree, uncertain, disagree, strongly disagree). These five responses are weighted 5, 4, 3, 2, 1 in the case of favorable statements and 1, 2, 3, 4, 5 in the case of unfavorable statements. This is a subject-centered approach where persons respond to each item on the basis of the extent to which they personally are willing to endorse the item. Therefore, systematic variation in subjects' reactions to items in the scale are attributed to individual differences in subjects rather than differences between items in terms of designated attributes.

Having chosen the general format of the scale, the first step in its construction consists of the collection of attitude statements concerning research-development in education. The initial guideline for selecting and generating these statements contained affective, behavioral, and cognitive components. One hundred sixteen attitude statements were derived from the literature on inquiry in education and from individuals asked to express their opinions concerning research-development in education.

As a second step, these 116 statements were checked for content validity by several faculty members in the College of Education according to standard procedures (Edwards, 1957). Items were eliminated that (1) were likely to be endorsed by individuals with opposite attitudes, by everyone, or by no one; (2) were based on factual knowledge or could be interpreted as such; (3) were obviously irrelevant to research-development; and (4) seemed subject to varying interpretations. The remaining statements were then checked independently by the College of Education faculty members to determine inter-judge agreement concerning the degree to which each item expressed a clear-cut favorable or unfavorable attitude toward research-development. Where judges disagreed on an item, it was discarded. By this procedure, 82 items were retained, half favorable and half unfavorable. These items were then randomized and printed with each item being supplied with five possible responses.

During September and October 1967, the scale was administered to a total of 204 education students at The Ohio State University (including those students in this investigation). Students were selected to represent a broad range of areas in education generally representative of potential research-development orientations, as well as areas that have traditionally not been associated with research-development orientations. Consequently, these students were comprised of undergraduates and graduates who were taking both research-development and non-research-development courses in education, and who were majoring in a variety of areas within education. Although respondents were given one hour to complete the scale, most of them finished in less than 30 minutes.

Respondents' scales were scored to determine the degree of endorsement of each statement. Based on the five-point Likert scoring method, a high score was considered to be indicative of favorable attitudes toward research-development in education, while a low score was felt to signify unfavorable attitudes. Accordingly, favorable statements were scored 5 for "strongly agree" to 1 for "strongly disagree," while unfavorable statements received a score of 1 for "strongly agree" to 5 for "strongly disagree."

In order to select items for the form of the Inquiry Orientation Scale used in this study, a statistical analysis was undertaken to determine the reliability or internal consistency of the scale, and the discrimination of individual items in terms of their relationship to the total scale score. Work is still in progress concerning the development of alternate forms of the Inquiry Orientation Scale (see next Chapter).

The total number of scorable items was 82, with a score of 1-5 obtainable for each item and an overall range of possible scores from 82 to 410. The scale mean and standard deviation actually obtained were 219.5 and 22.9, respectively. The reliability (internal consistency) of the sale was measured by Kudar-Richardson Formula Number 8 and yielded a reliability coefficient of .91. The item analysis conducted to determine the relationship of each item in the scale to the total scale involved computing a Pierson r for each item score with the total scale score minus that item, and yielded coefficients that ranged from .02 to .65.

In order to select the most appropriate items for the shortened form of the sale, a second analysis was undertaken using the 58 items that had correlation coefficients of .25 and higher with the total scale score for the initial pool of 82 items. The overall possible range of total scores for these 58 items was 58-290. The scale mean and standard deviation actually obtained were 158.2 and 19.7, respectively. The reliability of the scale, as measured by Kudar-Richardson Formula Number 8, was now .92. The item analysis yielded correlation coefficients for each item score to the total scale score minus that item that ranged from .21 to .65.

On the basis of this second analysis, 25 items were selected as being representative of inquiry orientation in this study. These items all had discrimination coefficients, determined by the second item analysis, that were .45 or higher, and were divided evenly between favorable and unfavorable statements (13 and 12, respectively). Although only these 25 items were scored with respect to this investigation, all subjects were given the 82-item scale for both pretesting and posttesting in order to keep both test administrations similar and for test development purposes. Posttest scores were entered as criterion measures for inquiry orientation, while pretest scores became predictor variables.

Educational Aspirations. A review of the literature (See Chapter II) indicated that persons who went to graduate school in education immediately after receiving the bachelor's degree as full-time students (in that order), and who obtained the doctorate, were more likely to become productively involved with research-development activities in education than individuals who deviated from this (Bargar, et al., 1965; Buswell, 1966; Sieber, 1966; Millikan, 1967). Therefore, it was felt that a knowledge of students' responses with regard to this variable would increase the precision of predictions concerning future involvement in educational research-development. Accordingly, the following dimensions of educational aspirations were tapped: (1) projected major area of specialization in graduate or professional school (education versus non-education), (2) delayed versus immediate entry to graduate or professional school, (3) full-time versus part-time study in graduate or professional school, and (4) highest level degree realistically sought.

Two questions were asked that attempted to get at these dimensions of educational aspirations. The first question incorporated the first three dimensions mentioned above, and asked respondents to check the category that best reflected their Future Educational Plans after receiving the bachelor's degree. Responses were scored from 1 for "No plans for any kind of graduate or professional school at this time" to 9 for "Immediate entry to graduate school in education as a full-time student." The second question asked subjects to check the category that best reflected the Highest Level Degree they realistically wished to obtain. Responses were scored from 1 for "Bachelor's" to 3 for "Ph.D., Ed.D., M.D., etc." Posttest scores for each of these two questions were entered as criterion measures, while pretest scores became predictor variables.

Occupational Aspirations. The major reason for initiating a research-development program at the undergraduate level was to recruit talented persons for future involvement with research-development activities in education, either as a primary activity or in conjunction with other roles that might be assumed within education. Therefore, it was important to include a measure of occupational aspirations in this direction. Three questions, combined to form an index, were asked to get at this variable. The first question

asked subjects to give the major and minor areas of their first and second choices within the field in which they planned to specialize in graduate or professional school. The second question asked subjects to rate on a five-point Likert-type scale their personal interest in participating in educational research-development as a primary occupational activity (embedded within several other educational activities; e.g., teaching, administration, guidance). The third question required respondents to rate on a five-point Likert-type scale their personal interest in participating in each of the following research-development activities in education regardless of their primary occupational commitment: (1) conducting research to test educational theories, (2) developing new materials and techniques in education, (3) disseminating new materials and techniques in education, (4) testing new ideas in the school, and (5) evaluating educational programs.

The score assigned to individuals on both the pretest and posttest with respect to major and minor areas of first and second choices was obtained by the following procedure:

1. There were four possible subquestions to which a person could respond: (a) major area of first choice, (b) major area of second choice, (c) minor area of first choice, and (d) minor area of second choice.

2. A response to any of the four subquestions was assigned the following values: (a) 1 if the response was research-development in education, and (b) 0 if the response was anything else.

3. It was felt that major area of first choice was the strongest choice indicating interest in a specialized area, and in descending order of strength of choice, major area of second choice, minor area of first choice, and minor area of second choice. Therefore, the score received on major area of first choice was multiplied by 4, and the rest, in descending order, by 3, 2, and 1.

4. The final score assigned to individuals was derived by adding together the scores received on each subquestion (maximum score of 10).

The question dealing with personal interest in participating in educational research-development as a primary occupational activity was scored by taking subjects' responses to the five-point Likert-type scale, with 1 representing "Not at all interested" to 5 indicating "Extremely interested." Scores with regard to personal interest in participating in each of the five research-development activities in education, regardless of primary occupational commitment, were derived by adding together students' responses to each of these activities on a five-point Likert-type scale, with 1 indicating "Not at all interested" to 5 representing "Extremely interested" (maximum score of 20).

The three scores were then combined into a single index that was felt to reflect the degree to which a person planned to become involved with research-development in education. Since there was no evidence indicating the relative importance of these three dimensions of occupational aspirations, it was decided to treat them on an equal basis by taking the lowest common denominator, based on the total number of points possible for each question. Therefore, the final index score for the pretest and posttest was derived by multiplying and then adding together the total score received on major and minor areas of first and second choices by 2, the score obtained on personal interest in participating in educational research-development as a primary activity by 5, and the score on personal interest in participation in the five educational research-development activities by 1. Posttest scores were entered as the criterion measure, while pretest scores became the predictor variable.

Undergraduate Education Program Attitudes. A review of the literature indicated that the very nature of undergraduate education programs has an inhibiting effect on the development of inquiry orientation; educational aspirations in the direction of going immediately to graduate school in education as a full-time student, and seeking a higher level degree; and occupational aspirations in the direction of involvement with research-development activities in education (Lazarsfeld and Sieber, 1964; Buswell, 1966; Sieber, 1966; Bargar, Okorodudu, Dworkin, et al., 1967). This was attributed to the notion that undergraduate education programs have usually treated education as a collection of skills and techniques to be mastered rather than an area for study and inquiry.

It seemed feasible that if the research-development program were a success, then the negative attitudes that students had toward pertinent aspects of the undergraduate education program would be changed to positive attitudes. The following dimensions of the undergraduate education program were examined to ascertain the degree to which this attitude change had occurred: (1) appropriateness of course work in education in terms of professional interests, (2) appropriateness of course work in education in terms of academic and intellectual interests, (3) degree of freedom for self-direction, (4) degree of student-faculty interaction outside the classroom in the College of Education, and (5) proportion of instruction in education considered superior (see Appendix M).

On the pretest, respondents were requested to react to each of these five characteristics on a five-point Likert-type scale, based on their experiences during the past academic year (1966-1967) only. Subjects were asked to do likewise on the posttest, except that they were told to base their responses only on the current academic year (1967-1968). The final index score assigned to students on the pretest and posttest was derived by adding together responses to each of the five undergraduate education program characteristics. Posttest

index scores were entered as the criterion measure, while pretest index scores became the predictor variable.

Administration of Instruments

The following testing order was followed for both pretesting and posttesting: Inquiry Orientation Scale, Undergraduate Education Program Attitudes, Educational Aspirations, and Occupational Aspirations. The total time necessary to complete testing was approximately 45 minutes. For pretesting each group was tested separately during the first week of Autumn Quarter 1967. Subjects were not tested according to group membership for posttesting; instead they either signed up for one of two possible testing sessions at the end of Spring Quarter 1968. For those persons who could not make either of these two dates, individual sessions were provided. The same examiner (the investigator) administered all tests.

Selection of Predictor Variables

Predictor variables entered in each stepwise regression analysis, the principle method of data analysis in this investigation, were selected on the basis of their potential relevance (predictive power) to each of the criterion measures and the ease with which they could be obtained. Due to the relatively small sample size, the number of selected predictor variables had to be limited. The rationale for this was that each predictor variable entered in the stepwise regression uses up one degree of freedom, so that the closer the degrees of freedom that are used up approximate the total number of students in the sample, the more difficult it is to achieve the F necessary to enter a predictor variable into the regression equation, and the greater the chance of obtaining spurious results. One variable (sex), which was felt to be of potential value as a predictor, had to be eliminated due to the small number of males in the total sample.

The 11 predictor variables finally selected for entry in each stepwise regression analysis were as follows:

1. Group Membership. One of the major reasons for establishing a research-development program at the undergraduate education level was to examine the impact of group membership on each of the criterion variables. Therefore, group membership was considered the most important predictor variable to be entered in each stepwise regression analysis.

2. Pretest Scores for all Criterion Measures. It was expected that pretest scores would be positively correlated with posttest scores for each of the criterion measures, especially for comparison groups where little change from pretest to posttest was anticipated. Also, the possibility existed that a given pretest score on one criterion variable might significantly correlate with a posttest score on another criterion variable, or that pretest scores might correlate significantly with one another. The reason for this was that each

criterion variable was attempting to tap a related factor called commitment to inquiry in education. In order to examine these possibilities, it was decided to enter the pretest scores for all criterion variables into each stepwise regression analysis (5 pretest measures).

3. Achievement. Achievement was measured by taking students' preprofessional cumulative quarter hour grade point average, which was easily obtained from student files. This predictor variable was selected because of the rather wide range of averages that was one parameter for identifying the total sample (2.80-4.00). Also, it was felt that this variable might be related significantly to several of the criterion variables. For example, students with averages at the lower end of the range might be less inclined to consider going to graduate school; they might find greater fault with the teacher education program and grading system; and they might not feel adequate enough to become involved with research-development activities in education due to the sigma of "superior student" that is sometimes attached to persons who become involved with these activities.

4. Aptitude. Aptitude was measured by taking students' percentile scores on the Verbal and Quantitative sections of the American College Test (American College Testing Program, 1962-1965), which were also obtained from student files. It was felt that these percentile scores might be potentially valuable as predictors for several of the criterion measures. For example, students with low scores on either the Verbal or Quantitative sections might be less inclined to consider going to graduate school, or they might look unfavorably at becoming involved with any kind of research-development activities in education because of the stereotype of these activities involving statistics or being geared to the mathematically oriented.

5. Number of Quarter Hours Completed. This variable, likewise obtained from student files, was selected because of the rather wide range of quarter hours completed prior to testing (45-135). It was felt that the earlier one was in his academic program the less likely the chance that he had seriously considered and/or made plans for going to graduate school or entering a specified occupational area within education in the future.

Data Analysis

There were four criterion variables involving five criterion measures (two for Educational Aspirations) in this investigation. The principle method of data analysis for each of these criterion measures was stepwise regression. This procedure computes a series of multiple linear regression equations in steps, adding and/or deleting one variable per step. The criteria for addition or deletion of variables are preselected values representing percentages of the appropriate F distributions (Draper and Smith, 1966, p. 171).

The variable entered at a given step is one which accounts for the greatest reduction in the error sum of squares, and consequently has the highest partial correlation (partialled on the other variables already in the equation) with the criterion measure in question. To enter the equation this variable must also exceed the addition criterion. At each step the variables already in the regression equation from the previous step are evaluated, and if the F value corresponding to the partial correlation of a variable in the equation (partialled on the other variables in the equation) is below the preselected deletion criterion value, the variable is removed and a new equation is computed. This procedure of evaluating (adding or deleting) the regression equation at each step continues until the limit of variables that can be added or deleted has been reached (Dixon, 1968).

Before computations could be undertaken, it was first necessary to eliminate linear dependency among one of the predictor variables (group membership). The reason for doing this was that inversion of a matrix is an essential step in the computer program developed to carry out the stepwise regression analysis, and the ipsative feature of the three discrete variables comprising group membership made this matrix inversion impossible if all three group membership variables were entered as predictors. However, by knowing group membership in any two of the three groups, it is possible to predict the third. Consequently, no information would be lost if one of the group membership variables were excluded from the analysis. Since membership in the experimental group was considered the most important of the three, it was decided by a flip of the coin to remove membership in the not-interested comparison group.

The following information will be presented at each step for the five separate stepwise regression analyses conducted in this investigation:

1. the F value for total regression;
2. the multiple correlations and proportion of criterion variance explained;
3. the partial F-test;
4. the name and number of variables entered in the final prediction equation;
5. the final prediction equation formula;
6. sample means, standard deviations (see Appendix N);
7. the predictor-criterion correlations (see Appendix O);
8. correlation matrices (see Appendix P).

The following formulae should aid the reader in more fully understanding the results obtained and the interpretation of them (Fulcomer, 1967):

Given that

$$\begin{bmatrix}\text{sums of squares}\\ \text{about the mean}\end{bmatrix} = \begin{bmatrix}\text{sums of squares}\\ \text{about regression}\end{bmatrix} + \begin{bmatrix}\text{sums of squares}\\ \text{due to regression}\end{bmatrix},$$

which is equivalent to

$\sum (Y - \bar{Y})^2 = \sum (Y - \hat{Y})^2 + \sum (\hat{Y} - \bar{Y})^2$, where Y is the criterion score for the ith person and $\hat{Y}$ is the predicted score for this person, the multiple correlation coefficient squared (R^2) is defined as

$$R^2 = \frac{\text{SS (due to regression)}}{\text{SS (about the mean - total)}} = \frac{\text{SSR}}{\text{SST}} .$$

The F ratio for total regression at each step is defined as

$$T(X) = \frac{R^2/p}{(1 - R2)/N-p-1} ,$$

where p is the number of predictor variables and N is the sample size for a given step. This test statistic is distributed as an $F_{p, N-p-1}$ variable.

The partial F-test (F value to enter or remove) for testing the significance of m additional predictors is defined as

$$T(X) = \frac{(R^2_{p+m} - R^2_p)/m}{(1 - R^2_{p+m}) / N-p-m-1} ,$$

where R^2_{p+m} is the squared multiple correlation coefficient of the p+m predictors, R^2_p is that of the p predictors, and m is the number of additional predictors. This test statistic is distributed as an $F_{m, N-m-1}$ variable.

The F-test for total regression will be performed with each criterion measure up to the 11th step, which includes all predictor variables used in this investigation ($\alpha = .01$). Predictor variables entered into the regression by the stepwise procedure will be evaluated at each step by the partial F-test ($\alpha = .10$). R^2 values will also be presented at each step to show the amount of criterion variance that has been explained.

Results of the Regression Analysis

This chapter presents the results of the evaluation of the undergraduate program during its first experimental year. To review, the objectives of the statistical analysis were to find answers to the following two questions: (1) Can scores on instruments developed to measure the criterion variables be significantly predicted using selected predictor variables in a stepwise regression analysis? (2) What predictor variables enter the resulting regressions and hence merit consideration in subsequent research? The hypothesis was that Membership in the Experimental Group as a predictor variable will contribute significantly in a positive direction to the final regression equation with each criterion measure obtained by means of stepwise regression.

A correlational design was used with stepwise regression as the principle method of data analysis. The sample consisted of 21 persons in the experimental group, 15 students in the not-interested comparison group, and 15 individuals in the interested 1968 comparison group. Instruments were developed to measure each of the criterion variables. Posttest scores received on these instruments constituted the final criterion measures, while pre-test scores were entered as predictor variables. Eleven predictor variables were selected on the basis of their potential relevance (predictive power) to each of the criterion measures, and the ease with which they could be obtained.

The results of each stepwise regression analysis are organized separately under individual criterion variable headings. The major findings of this investigation were that scores on each of the criterion measures could be significantly predicted, and that Membership in the Experimental Group contributed significantly in a positive direction to the final regression equation with each criterion measure, thus confirming the research hypothesis. Apart from this, no other predictor variable was consistently included in the final regression equations for all criterion measures. Two predictor variables (Pre-professional Cumulative Quarter Hour Grade Point Average and Number of Quarter Hours Completed) failed to achieve the partial F-test (.10) necessary for inclusion in the final regression equation for any of the criterion measures.

Inquiry Orientation

The significance test for total regression previously discussed was performed with respect to the Inquiry Orientation Scale criterion measure at each of the 10 steps. One predictor variable (Pretest-Occupational Aspirations) failed to achieve the necessary F value to be included in the regression analysis. For each of the 10 steps, the multiple correlation coefficients were significant at the .01 level. The multiple correlations ranged from .5407 at the first step to .7227 at the 10th step. R^2, the proportion of criterion variance explained, ranged from .2924 to .5223 over the 10 steps (see Table III).

TABLE III

STEPWISE REGRESSION PREDICTING THE INQUIRY ORIENTATION SCALE CRITERION MEASURE

Step Number	Variable Entered	Removed	Number of Predictors	Multiple R	R^2	Increase in R^2	Partial F Test	Total F Test
1.	Pretest-Inquiry Orientation Scale		1	.5407	.2924	.2924	20.2466[a]	20.247[b]
2.	Membership in Experimental Group		2	.6219	.3868	.0944	7.3897[a]	15.138[b]
3.	Pretest-Highest Level Degree		3	.6634	.4401	.0534	4.4794[a]	12.317[b]
4.	Pretest-Future Educational Plans		4	.6795	.4617	.0215	1.8378	9.862[b]
5.	Preprofessional Grade Point Hour		5	.6920	.4789	.0172	1.4864	8.270[b]
6.	Membership in Interested 1968 Comparison Group		6	.7031	.4943	.0155	1.3450	7.169[b]
7.	Number of Quarter Hours Completed		7	.7114	.5061	.0118	1.0295	6.296[b]
8.	ACT Verbal Percentile		8	.7151	.5114	.0052	0.4508	5.495[b]
9.	Pretest-Undergraduate Education Program Attitude Index		9	.7206	.5192	.0078	0.6671	4.920[b]
10.	ACT Quantitative Percentile		10	.7227	.5223	.0031	0.2593	4.374[b]

[a]Significant at the .10 level [b]Significant at the .01 level

Partial F-tests were performed at each of the 10 steps to assess the increased amount of criterion variance explained by inclusion of additional predictor variables in the stepwise regression procedure (see Table III). Three predictor variables were significant at .10 level (the cut-off point for inclusion as a predictor variable). These were Pretest-Inquiry Orientation, Membership in the Experimental Group, and Pretest-Highest Level Degree. The multiple correlation coefficient at the step (3) which included all these significant predictor variables was .6634, and R^2 was .4401. The seven other predictor variables that were entered by the stepwise procedure, but not included in the final regression equation, raised the multiple correlation to .7724 but accounted for only 8.22 per cent more of the criterion variance over that already explained by the three significant predictor variables.

The final regression equation, consisting of these three significant predictor variables, was:

$Z = 57.46921 + (0.44671)(W) + (-4.17264)(X) + (7.91149)(Y)$, where Z is the predicted Inquiry Orientation Scale criterion score; 57.46921 is the constant; W is Pretest-Inquiry Orientation; X is Pretest-Highest Level Degree; and Y is Membership in the Experimental Group.

Educational Aspirations

Since Educational Aspirations were composed of two criterion measures (Future Educational Plans and Highest Level Degree), each one was treated separately. The significance test for total regression performed at each of the 10 steps with respect to Future Educational Plans yielded multiple correlation coefficients that were all significant at the .01 level, except for the 10th step (Number of Quarter Hours Completed) where the significance level was .05. The predictor variable Pretest-Occupational Aspirations Index again did not obtain the necessary F value to be included in the analysis. The multiple correlations ranged from .4726 at the first step to .6244 at the 10th step. R^2 ranged from .2233 to .3899 over the 10 steps (see Table IV).

The partial F-tests performed at each of the 10 steps yielded three significant predictor variables at .10 level. They were Membership in the Experimental Group, Quantitative ACT Percentile, and Verbal ACT Percentile. The multiple correlation at the third step, which included these three predictor variables, was .5660 and R^2 was .3204. The seven other predictor variables that were entered by the stepwise procedure (through the 10th step) raised the multiple correlation to .6224 but accounted for only 6.95 per cent more of the criterion variance over that previously explained by the three significant predictor variables.

The prediction equation, consisting of these three significant predictor variables, was:

$Z = 4.24629 + (2.92509)(W) + (-0.03967)(X) + (0.03037)(Y)$, where

TABLE IV

STEPWISE REGRESSION PREDICTING THE FUTURE EDUCATIONAL PLANS CRITERION MEASURE

Step Number	Variable Entered	Removed	Number of Predictors	Multiple R	R^2	Increase in R^2	Partial F Test	Total F Test
1.	Membership in the Experimental Group		1	.4726	.2233	.2233	14.0884[a]	14.088[b]
2.	ACT Quantitative Percentile		2	.5250	.2756	.0523	3.4628[a]	9.130[b]
3.	ACT Verbal Percentile		3	.5660	.3204	.0448	3.0974[a]	7.385[b]
4.	Pretest-Inquiry Orientation Scale		4	.5944	.3533	.0329	2.3392	6.281[b]
5.	Pretest-Undergraduate Education Program Attitude Index		5	.6035	.3642	.0109	0.7739	5.155[b]
6.	Preprofessional Grade Point Hour		6	.6101	.3723	.0081	0.5674	4.349[b]
7.	Membership in the Interested 1968 Comparison Group		7	.6154	.3787	.0064	0.4439	3.744[b]
8.	Pretest-Future Educational Plans		8	.6182	.3822	.0035	0.2384	3.248[b]
9.	Pretest-Highest Level Degree		9	.6231	.3883	.0061	0.4075	2.892[b]
10.	Number of Quarters Completed		10	.6244	.3899	.0016	0.1078	2.557

[a]Significant at the .10 level [b]Significant at the .01 level.

Z is the predicted Future Educational Plans criterion score; 4.24629 is the constant; W is Membership in the Experimental Group; X is ACT Quantitative Percentile; and Y is ACT Verbal Percentile.

The significance test for total regression performed at each of the 11 steps with regard to the Highest Level Degree criterion measure resulted in multiple correlation coefficients that were significant at the .01 level. The multiple correlations ranged from .5094 at the first step to .7116 at the 11th step. The range of R^2 was from .2595 to .5063 over the 11 steps (see Table V).

The partial F-tests conducted at each of the 11 steps resulted in two significant predictor variables at the .10 level. They were Pretest-Future Educational Plans and Membership in the Experimental Group. Two other predictor variables just missed the significance level necessary for inclusion in the final prediction equation: ACT Verbal Percentile and Pretest-Inquiry Orientation Scale (p = 2.7769 and 2.6476, respectively). The multiple correlation at the second step, which included these two significant predictor variables, was .6097 and R^2 was .3718. The nine other predictor variables entered by the stepwise procedure (through the 11th step) raised the multiple correlation to .7116 and accounted for 13.45 per cent more of the criterion variance over that previously explained by the two significant predictor variables.

The regression equation, composed of these two significant predictor variables, was:

$$Y = 1.32248 + (0.09598)(W) + (0.46505)(X),$$

where Y is the Highest Level Degree criterion score; 1.32248 is the constant; W is Pretest-Future Educational Plans; and Z is Membership in the Experimental Group.

Occupational Aspirations

The significance test for total regression performed at each of the 11 steps with respect to the Occupational Aspirations Index criterion measure yielded multiple correlations that were significant at the .01 level. The multiple correlation coefficients ranged from .6418 at the first step to .7815 at the 11th step. R^2 ranged from .4119 to .6107 over the 11 steps (see Table VI).

The partial F-tests conducted at each of the 11 steps resulted in two significant predictor variables at the .10 level. These were Membership in the Experimental Group and Pretest-Occupational Aspirations Index. The multiple correlation at the second step, which included these two significant predictor variables, was .7386 and R^2 was .5455. The nine other predictor variables that were entered by the stepwise procedure (through the 11th step) brought the multiple correlation up to .7815 but accounted for only 6.52 per cent more of the criterion variance over that already explained by the two significant predictor variables.

TABLE V

STEPWISE REGRESSION PREDICTING THE HIGHEST LEVEL DEGREE CRITERION MEASURE

Step Number	Variable Entered	Removed	Number of Predictors	Multiple R	R^2	Increase in R^2	Partial F Test	Total F Test
1.	Pretest-Future Educational Plans		1	.5094	.2595	.2595	17.1709[a]	17.171[b]
2.	Membership in the Experimental Group		2	.6097	.3718	.1123	8.5807[a]	14.204[b]
3.	ACT Verbal Percentile		3	.6378	.4068	.0350	2.7769	10.745[b]
4.	Pretest-Inquiry Orientation Scale		4	.6627	.4391	.0323	2.6476	9.004[b]
5.	Membership in the Interested 1968 Comparison Group		5	.6732	.4532	.0140	1.1556	7.458[b]
6.	Preprofessional Grade Point Hour		6	.6864	.4712	.0180	1.5017	6.535[b]
7.	Pretest-Highest Level Degree		7	.7026	.4937	.0225	1.9105	5.990[b]
8.	ACT Quantitative Percentile		8	.7059	.4982	.0045	0.3785	5.213[b]
9.	Pretest-Undergraduate Education Program Attitude Index		9	.7082	.5051	.0033	0.2731	4.584[b]
10.	Number of Quarter Hours Completed		10	.7115	.5062	.0046	0.3757	4.100[b]
11.	Pretest-Occupational Aspirations Index		11	.7116	.5063	.0001	0.0118	3.636[b]

[a]Significant at the .10 level

[b]Significant at the .01 level

TABLE VI

STEPWISE REGRESSION PREDICTING THE OCCUPATIONAL ASPIRATIONS INDEX CRITERION MEASURE

Step Number	Variable Entered	Removed	Number of Predictors	Multiple R	R^2	Increase in R^2	Partial F Test	Total F Test
1.	Membership in Experimental Group		1	.6418	.4119	.4119	34.3155[a]	34.315[b]
2.	Pretest-Occupational Aspirations Index		2	.7386	.5455	.1336	14.1065[a]	28.800[b]
3.	ACT Quantitative Percentile		3	.7481	.5597	.0142	1.5190	19.914[b]
4.	Pretest-Highest Level Degree		4	.7564	.5722	.0125	1.3430	15.380[b]
5.	Pretest-Future Educational Plans		5	.7659	.5866	.0144	1.5648	12.768[b]
6.	Pretest-Undergraduate Education Program Attitude Index		6	.7754	.6012	.0147	1.6200	11.057[b]
7.	Number of Quarter Hours Completed		7	.7786	.6062	.0050	0.5412	9.456[b]
8.	Pretest-Inquiry Orientation Scale		8	.7794	.6075	.0013	0.1390	8.126[b]
9.	Preprofessional Grade Point Average		9	.7802	.6088	.0013	0.1351	7.089[b]
10.	ACT Verbal Percentile		10	.7811	.6102	.0014	0.1444	6.261[b]
11.	Membership in the Interested 1968 Comparison Group		11	.7815	.6107	.0005	0.0508	5.562[b]

[a]Significant at the .10 level

[b]Significant at the .01 level

The final prediction equation, which included these two significant predictor variables, was:

$$Y = 11.67303 + (13.81538)(W) + (0.59505)(X),$$

where Y is the predicted Occupational Aspirations Index criterion score; 11.67303 is the constant; W is Membership in the Experimental Group; and X is Pretest-Occupational Aspirations Index.

Undergraduate Education
Program Attitudes

The significance test for total regression conducted at each of the 11 steps for the Undergraduate Education Program Attitude Index criterion measure yielded multiple correlations that were significant at the .01 level. The multiple correlation coefficients ranged from .4637 at the first step to .7153 at the 11th step. The range of R^2 was from .2150 to .5117 over the 11 steps (see Table VII).

The partial F-tests performed at each of the 11 steps yielded four significant predictor variables at the .10 level. These were Membership in the Experimental Group, Pretest-Undergraduate Education Program Attitude Index, Pretest-Highest Level Degree, and Membership in the Interested 1968 Comparison Group. The multiple correlation at the fourth step, which included these four significant predictor variables, was .6627 and R^2 was .4391. The seven other predictor variables that were entered by the stepwise procedure (through the 11th step) increased the multiple correlation to .7153 but accounted for only 7.26 per cent more of the criterion variance over that previously explained by the four significant predictor variables.

The final prediction equation, involving these four significant predictor variables, was:

$$Z = 7.96533 + (0.37392)(V) + (2.02592)(W) + (-2.75764)(X) + (1.56543)(Y),$$

where Z is the predicted Undergraduate Education Program Attitude Index criterion score; 7.96533 is the constant; V is Pretest-Undergraduate Education Program Attitude Index; W is Pretest-Highest Level Degree; X is Membership in the Interested 1968 Comparison Group; and Y is Membership in the Experimental Group.

Discussion of the Results

The finding that the proportion of variance accounted for was high with respect to each criterion measure must be interpreted with caution for the following two reasons: (1) The stepwise regression procedure is designed to select those predictor variables that will yield the highest regression coefficient (R) and does not guarantee

TABLE VII

STEPWISE REGRESSION PREDICTING THE UNDERGRADUATE EDUCATION PROGRAM ATTITUDE INDEX CRITERION MEASURE

Step Number	Variable Entered	Removed	Number of Predictors	Multiple R	R^2	Increase in R^2	Partial F Test	Total F Test
1.	Membership in Experimental Group		1	.4637	.2150	.2150	13.4229[a]	13.423[b]
2.	Pretest-Undergraduate Education Program Attitude Index		2	.5388	.2903	.0753	5.0923[a]	9.818[b]
3.	Pretest-Highest Level Degree		3	.6077	.3694	.0790	5.8899[a]	9.176[b]
4.	Membership in the Interested 1968 Comparison Group		4	.6627	.4391	.0698	5.7207[a]	9.003[b]
5.	ACT Verbal Percentile		5	.6763	.4574	.0183	1.5178	7.587[b]
6.	Pretest-Inquiry Orientation Scale		6	.6906	.4770	.0196	1.6543	6.687[b]
7.	Pretest-Future Educational Plans		7	.7027	.4938	.0169	1.4321	5.993[b]
8.	Preprofessional Grade Point Average		8	.7084	.5019	.0081	0.6811	5.290[b]
9.	Pretest-Occupational Aspirations Index		9	.7133	.5089	.0070	0.5803	4.720[b]
10.	ACT Quantitative Percentile		10	.7150	.5112	.0024	0.1953	4.184[b]
11.	Number of Quarter Hours Completed		11	.7153	.5117	.0004	0.0345	3.715[b]

[a]Significant at the .10 level [b]Significant at the .01 level

that the best set of all possible predictors has been chosen or that the set selected will be the most useful for predicting future behavior. (2) The sample size was relatively small in relation to the number of predictor variables included, so that the high R's may represent some overfitting. Keeping these limitations in mind, the rest of this section is devoted to a discussion of the results of this investigation by criterion variable heading.

Inquiry Orientation. Three predictor variables, accounting for over 44 per cent of the variance, were included in the final regression equation with respect to this criterion variable: Pretest-Inquiry Orientation Scale, Membership in the Experimental Group, and Pretest-Highest Level Degree. The high positive correlation between pretest and posttest scores for the Inquiry Orientation Scale indicates that there was little change in ranking for subjects between these two measures; i.e., any change that occurred was in the same general direction and at the same rate. It was also found that Membership in the Experimental Group, which was likewise included in the final regression equation, was highly correlated with the Pretest-Inquiry Orientation Scale ($r = .438$)*. This implies that although there was little change on pretest-posttest scores, persons in the experimental group tended to receive higher scores on both the pretest and posttest than individuals in either comparison group. As a matter of fact, there was a significant high negative correlation between Membership in the Not Interested Comparison Group and the Pretest-Inquiry Orientation Scale ($r = -.505$)*.

The above finding was contrary to expectations, since it was felt that persons in the experimental group would substantially increase their scores from pretest to posttest. Some possible explanations for this result might be that persons in the experimental group already had high inquiry orientations when they entered the program so that it was unrealistic to expect them to increase these orientations even more on the posttest; or it could be that some kind of "Hawthorne Effect" was operating even though steps were taken to keep persons in the experimental group naive concerning the nature of the evaluation. In any respect, the fact remains that individuals in the experimental group still had significantly higher Inquiry Orientation posttest scores than persons in the comparison groups, even after being exposed to difficult content matter (design and statistics) which has traditionally tended to discourage persons from becoming involved in research-development.

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*For intercorrelations between specific variables in this and subsequent discussions, see Table VIII, "Intercorrelations Among All Criterion Measures and Predictor Variables," page 78.

No explanation can be offered concerning the negative correlation for Pretest-Highest Level Degree in the final regression equation for this criterion measure. It was expected that the higher the level degree a person plans to obtain, the higher his score would be on the Inquiry Orientation Scale, since pursuing a higher level degree traditionally entails independent research in the form of a thesis or dissertation and is associated with scholarly and inquiry-oriented behavior.

Even though individuals in the experimental group did not significantly change their inquiry orientations from pretest to posttest, they still had higher inquiry orientations than either comparison group, even after being exposed to difficult course content. Therefore, it appears important to continue to offer a research-development program to talented undergraduate education students in order to maintain and mature their inquiry orientations (attitudes toward research-development in education).

Educational Aspirations. This criterion variable was measured by responses to two questions with a separate stepwise regression analysis performed on each of them. With respect to Future Educational Plans, three predictor variables, accounting for a little more than 32 per cent of the variance, were included in the final regression equation: Membership in the Experimental Group, ACT Verbal Percentile, and ACT Quantitative Percentile. Since the pretest score for this criterion measure was not included in the final regression, scores on the pretest were not significantly related to scores on the posttest. Furthermore, there was little relation between the pretest and group membership. Therefore, the finding that Membership in the Experimental Group was included in the final regression equation implies that persons in the experimental group tended to significantly change their scores on this criterion measure in the positive direction from pretesting to posttesting. In contrast, although membership in either comparison group was not included in the final regression equation, persons in these groups tended to receive lower scores on this criterion measure.

Since ACT Verbal Percentile was included in a positive manner in the final regression equation, it can be inferred that there is a tendency for persons with higher verbal aptitudes to plan to go to graduate school in education immediately after receiving the bachelor's degree as full-time students. This lends support to the results of other investigations (Berelson, 1960; Davis, 1964). The finding that ACT Quantitative Percentile, also included in the final regression equation, was negatively correlated with the criterion measure was not anticipated; on the contrary, quite the opposite was expected. One highly speculative explanation might be that education students tend to be lower on quantitative aptitude measures than college students in general, while just the opposite occurs with respect to verbal aptitude, a finding which has been attributed to the high proportion of females majoring in education (Burnett and MacMinn, 1966).

With respect to Highest Level Degree, only two predictor variables, which accounted for more than 37 per cent of the variance, were included in the final regression equation: Pretest-Future Educational Plans and Membership in the Experimental Group. The finding that the pretest score for this criterion measure was not included in the final regression equation, and that there was little relationship between group membership and the pretest score, suggests that persons in the experimental group tended to change significantly more in the positive direction from pretest to posttest than persons in either comparison group. In contrast, although membership in either comparison group was not included in the final regression equation, persons in both comparison groups tended to receive lower scores on the posttest. It was anticipated that subjects who scored high on Pretest-Future Educational Plans would also tend to score high on Highest Level Degree since one is a logical extension of the other; the results verified this expectation.

The results of these two criterion measures indicate that persons in the experimental group significantly changed their educational aspirations in a positive direction between the two testing periods, while individuals in the comparison groups either tended not to change their educational appirations or changed them in a negative direction. These results have significant implications for research-development in education, since the findings of several investigations suggest that actual time spent in immediate continuous full-time study toward the doctorate is positively related to future research-development productivity, while discontinuous interrupted graduate study is negatively related to later research-development productivity (Buswell, 1966; Heiss, 1966; Berelson, 1960; Clark, 1957; Sibley, 1948). In other words, regardless of what index of research-development productivity is employed, the longer the period of doctoral study, the less likely the possibility of an individual's becoming involved primarily in research-development in education. Although the analysis used does not establish a cause-effect relationship between experimental treatment and aspirations, the results of this criterion variable present strong positive evidence that a research-development program should continue to be offered to talented undergraduate education students.

Occupational Aspirations. Only two predictor variables were included in the final regression equation for this criterion measure, but they accounted for more than 54 per cent of the variance. These were Membership in the Experimental Group and Pretest-Occuaptional Aspirations Index. Similar to the results of Inquiry Orientation, there was a high correlation between pretest-posttest scores on this criterion variable, and between Membership in the Experimental Group and Pretest-Occupational Aspirations Index ($r = .450$). This implies that although there was little change on pretest-posttest scores, persons in the experimental group tended to receive higher scores on both the pretest and posttest than individuals in either comparison group.

Since the possibility of a career in research-development is usually considered quite late in the field of education (Brown and Slater, 1960; Brown, 1966), the results of this criterion variable have important implications for research-development in education. Even though there was no pretest-posttest change, the fact remains that individua s in the experimental group still had high occupational aspirations in the direction of future involvement in research-development activities in education, after having been exposed to traditionally difficult subject matter (design and statistics). There is no way of knowing what would have happened to the research-development career plans of these individuals if a research-development program had not been offered.

The results of several studies indicate that close interaction with college teachers who are actively engaged in research-development, and meaningful experiences in research-development are important influences on future involvement and productivity in research-development (Buswell, 1966; Heiss, 1966; Sieber, 1966; Brown and Slater, 1960; Sibley, 1948). Based on the results of this criterion variable and taking into consideration the findings of other investigations, research-development programs should be offered to interested talented undergraduate education students, if for no other reason than to expose them to education faculty members who are engaged in research-development activities, and to maintain and mature their interest in future involvement with research-development in education.

Undergraduate Education Program Attitudes. Four predictor variables, the most of any of the stepwise regression analyses, were included in the final regression equation for this criterion measure, and accounted for almost 44 per cent of the variance. These were Membership in the Experimental Group, Pretest-Undergraduate Education Program Attitude Index, Pretest-Highest Level Degree, and Membership in the Interested 1968 Comparison Group. Since pretest scores for this criterion measure were included in a positive manner in the final regression equation, it can be assumed that any change that occurred tended to be in the same general direction and at the same rate for the total sample. Also, there was no correlation to speak of between the pretest for this criterion measure and group membership. Therefore the results indicate that there was a significant change in the positive direction between the two testing periods for persons in the experimental group, while there was a significant change in the negative direction for persons in the interested 1968 comparison group. No explanation can be offered to account for the finding that Pretest-Highest Level Degree was included in the final regression equation in a positive manner.

An extensive review of the literature indicated that the separate attitudes tapped in this Index are strongly related to future involvement and productivity in educational research-development (Bargar, Okorodudu, Dworkin, et al., 1967). In other words, if we are interested in recruiting persons who are committed to inquiry in education, then we must offer them experiences in their undergraduate education programs that will (1) satisfy their professional and intellectual interests; (2) permit them to interact with faculty who

are actively engaged in educational research-development; (3) give them freedom for self-direction in their education courses, e.g., independent study; (4) make the course work in education stimulating enough to motivate them in this direction. Although it is not possible to establish a cause-effect relationship between the research-development program and positive change in the Program Attitude Index, there is a strong possibility that at least the program contributed to this positive change. Again, the results of this analysis strongly suggest that some kind of research-development program should be offered to talented undergraduate education majors.

Omitted Predictor Variables. The finding that Preprofessional Cumulative Quarter Hour Grade Point Average and Number of Quarter Hours Completed did not enter any of the final regression equations was not anticipated; it was expected that these two predictor variables would contribute to the final regression equations for at least some of the criterion measures. With respect to Preprofessional Average, some possible explanations for this finding might be that all subjects were at the upper end of the grade continuum, so that the range was not wide enough to reflect differences with respect to the criterion measures; or that due to the lack of a standardized grading system, this predictor variable was actually random and useless. With respect to Number of Quarter Hours Completed, there was a fairly wide range of responses. Therefore this result might be attributed to the possibility that students in this sample, being a select group, had formed their initial attitudes and aspirations with respect to the criterion variables early in their academic programs and therefore could not be differentiated on this predictor variable.

Conclusions

One of the most significant findings in this investigation was that Membership in the Experimental Group was the only predictor variable included in a positive manner in the final regression equation for each criterion measure. The results showed that individuals in the experimental group tended to receive higher posttest scores on all criterion measures than persons in either comparison group. There was a significant positive change for persons in the experimental group from the pretest to the posttest for the two Educational Aspirations criterion measures and Undergraduate Education Program Attitude Index. Even though there was no significant change on posttest scores with respect to the Inquiry Orientation Scale and the Occupational Aspirations Index, the results indicated that individuals in the experimental group tended to score significantly higher on both the pretest and posttest for these criterion measures than persons in either comparison group. In contrast, an inspection in Table VIII of the intercorrelations of all variables (criterion and predictor) shows that membership in either comparison group tended to be associated with lower scores on all criterion measures.

TABLE VIII

INTERCORRELATIONS AMONG ALL CRITERION MEASURES AND PREDICTOR VARIABLES

Variable Name	Variable Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Preprofessional Cumulative Grade Point Hour	1	1.000	0.165	-0.063	-0.039	-0.059	0.106	0.294	-0.253	-0.248	-0.305	-0.104	-0.167	-0.253	-0.123	-0.192	0.216	-0.008
ACT Verbal Percentile	2		1.000	-0.037	-0.072	-0.075	-0.226	-0.138	-0.175	-0.272	-0.148	0.170	-0.316	-0.078	-0.290	-0.131	0.117	-0.007
ACT Quantitative Percentile	3			1.000	-0.062	0.005	-0.104	0.022	0.018	0.047	0.075	-0.213	-0.047	0.141	-0.005	0.033	0.072	-0.107
Number of Quarter Hours Completed	4				1.000	0.049	-0.033	0.002	-0.010	-0.256	0.052	0.088	0.074	0.193	0.113	0.238	0.181	-0.438
Pretest-Inquiry Orientation Scale	5					1.000	0.409	0.340	0.758	-0.210	0.541	0.365	0.473	0.549	0.007	0.438	-0.505	0.032
Pretest-Future Educational Plans	6						1.000	0.639	0.423	0.075	0.214	0.163	0.509	0.278	0.327	0.202	-0.277	0.059
Pretest-High-Level Degree	7							1.000	0.315	-0.111	0.015	0.104	0.461	0.155	0.368	0.282	-0.188	-0.117
Pretest-Occupational Orientation Index	8								1.000	-0.031	0.493	0.309	0.477	0.615	0.089	0.450	-0.517	0.030
Pretest-Undergraduate Education Program Attitude Index	9									1.000	-0.069	-0.206	-0.044	-0.083	0.278	0.008	-0.189	0.180
Posttest-Inquiry Orientation Scale	10										1.000	0.523	0.493	0.660	0.187	0.513	-0.326	-0.228
Posttest-Future Educational Plans	11											1.000	0.262	0.508	0.303	0.473	-0.353	-0.158
Posttest-Highest Level Degree	12												1.000	0.390	0.310	0.431	-0.265	-0.201
Posttest-Occupational Aspirations Index	13													1.000	0.245	0.642	-0.445	-0.248
Posttest-Undergraduate Education Program Attitude Index	14														1.000	0.464	-0.101	-0.400
Membership in Experimental Group	15															1.000	-0.540	-0.540
Membership in Not Interested Group	16																1.000	-0.417
Membership in Interested 1968 Group	17																	1.000

Even though the regression analysis does not establish proof of a causal relationship between the research-development program and the criterion measures, the conclusions reached with respect to each criterion variable and supported by the results of other investigations point to the feasibility of offering a research-development program at the undergraduate level. The results strongly suggest that undergraduate research-development training can be an important means of recruiting talented undergraduate education students into careers directly or significantly related to inquiry in education.

Recommendations for Further Study

The present analysis has demonstrated that scores on instruments designed to measure each of the criterion variables can be significantly predicted for the present sample; and that Membership in the Experimental Group is positively related to receiving a high score on each criterion measure. However, there were a number of limitations in this investigation. Several possible extensions and subsequent research seem necessary before prediction, in the practical sense, can be effectively achieved.

Some of the limitations inherent in this study were (1) lack of standardized instruments with which to measure the criterion variables; (2) the small number of males included in the total sample which eliminated the inclusion of sex, felt to be a potentially powerful predictor variable; (3) the small sample size with respect to the number of predictor variables involved which might have contributed to some overfitting with the R's; (4) the fact that persons in the comparison groups volunteered for both pretesting and posttesting, whereas individuals in the experimental group were forced to take all testing might have influenced the nature of responses; and (5) the possibility that persons in the experimental group were not kept sufficiently naive concerning the nature of this investigation might have contributed to the high scores they received on the instruments.

Cross-validation studies are necessary to determine whether similar prediction is possible with other samples. The addition of new predictor variables might increase and shed new light on the nature and accuracy of the predictions. Different designs might be employed to examine the impact of similar research-development programs on knowledge, application, and commitment variables; e.g., the use of a "true" experimental design and analysis of variance might make it possible to examine cause-effect relationships. Of extreme importance is the necessity of conducting follow-up studies with this and subsequent samples to actually observe future research-development behavior patterns of persons who take a program of this nature.

LONGITUDINAL DATA FROM THE FIRST TWO UNDERGRADUATE GROUPS (1969-1970)

The vast majority of students in the program enter during their sophomore and junior years, with the largest single group coming from the sophomore class. As a result some considerable length of time is required before many of these students are graduated and in the field sufficiently long for follow-up data to be possible. While a very few students had graduated during the Spring and Summer quarters of 1968, it was not until June of 1969 that a group of any size had in fact completed the program and graduated. Subsequently, it was not until the present Spring quarter, 1970, that these same individuals had been in the field sufficiently long for any feedback on their activites to be available. The remainder of the first group will not be graduating until the present quarter, Spring 1970. Thus, it is not possible at the present time to garner a total picture of the longitudinal impact of the program on students' eventual careers. The results that are available are incomplete and pertain to a relatively small number of students.

A major factor of interest about which some data are available concerns the number of students who have accepted positiors in which research, development and evaluation skills are an important part of their activities. Students from whom such data are available can be classed into two general categories: (1) those who have completed the program, who have graduated from the university and who have been in the field for 3 or more quarters; and (2) <u>all</u> those who have completed the program and who will have graduated as of June 30, 1970. Data from this latter group are of course even more incomplete than from the former group. However, some indication of the employment potential of these persons can be obtained.

From Table IX we may determine that as of June 30, 1970, 13 students from the first experimental group (1967-68) had completed the program, had graduated from the university, and had been employed for approximately one year in the field. In addition, two students who were members of the second experimental group (1968-1969) had also graduated and had been in the field for approximately one year. Of this total group of 15, 7 were involved in positions in which research, development or evaluation activities played a significant role. Five of these students occupied positions in which full time was devoted to these activities, while two students were employed in positions in which part time was devoted to these activities. Thus it may be stated that approximately one-half of those students completing the program have moved into professional positions in which research, development and evaluation play a major role. This may be considered a significant output from the initial phases of an experimental program of this nature.

If <u>all</u> students graduating as of June 30, 1970, are considered, and if the additional criterion of employment at time of graduation is viewed as indicative of possible career direction, we find a similarly

TABLE IX

DISTRIBUTION OF RESEARCH, DEVELOPMENT AND EVALUATION (R,D&E) POSITIONS OF GRADUATES FROM THE PROGRAM AS OF JUNE, 1970

	Graduates, Spring and Summer, 1969				Graduates, Spring 1970		
	Full-Time RD&E	Part-Time RD&E	Part-Time RD&E at Graduation	Other Graduates	Part-Time RD&E at Graduation	Other Graduates	
1st Experimental Group, 1967-68	3	2	1	7	2	2	17
2nd Experimental Group, 1968-69	2	0	0	0	1	2	5
Totals	5	2	1	7	3	4	22

Per Cent of graduates employed in research one year after graduation - 47% (7)

Per Cent of all graduates employed in research after graduation - 32% (7)

Per Cent of graduates employed in research either at the time of or after graduation - 50%(11)

positive picture. Of the total of 22 students who will have completed the program and graduated by the end of Spring Quarter this year, 11 are either involved in employment in research, development or evaluation, as discussed in the previous paragraph, or were involved in such employment at the time of graduation. Thus, approximately one half of all those persons who have completed the program can be said to be involved in such activities to a significant degree. It may be added that a number of these 11 individuals are presently pursuing graduate programs in the area of educational development. Of the remaining students in these first two experimental groups, approximately half are presently employed as research assistants or research aides in various positions both off and on campus.

From the combined figures presented above it can be concluded that the program has, without question, had a significant impact on the career plans of talented undergraduate education majors. The program may thus be considered to be successful. In this regard, it is important to note that it has been approved as a permanent part of the undergraduate curriculum in the College of Education. In addition, its success has led to serious considerations relative to its possible expansion. The further implications and projected directions of the program will be discussed in the following chapters.

A SURVEY OF OHIO PUBLIC SCHOOL ADMINISTRATORS FOR THE PURPOSE OF EVALUATING THE UNDERGRADUATE RESEARCH AND DEVELOPMENT TRAINING PROGRAM

by Robert R. Bargar and Dan Hagan

Purpose

A survey was conducted in the spring of 1969 to obtain feedback from public school administrators concerning (1) their responses to the purpose and content of the undergraduate research and development minor and (2) to assess the number of job opportunities available to the graduates of the program. The survey was designed to obtain three types of information:

1. Types of research and development positions presently existing in Ohio public schools.
2. An assessment of the number of positions which might be open to graduates of the program.
3. Suggestions and reactions from administrators and research directors concerning the purpose and content of the training program.

Procedure

A sample size of 100 was selected. The sample included all of the larger city and county districts. The balance of the sample

included representative medium and small-sized districts. Because it was anticipated that districts of different sized enrollments would have varying interests and personnel requirements in the research and development areas, the Ohio Education Directory was consulted to obtain information on the districts which list research departments and to obtain enrollment estimates. Although all of the questionnaires asked essentially the same information, it was decided to use phrasing which would apply to three enrollment categories:

1. Large districts of over 15,000 students -- these questionnaires were phrased to apply to the interests of either research directors, or division heads who might employ R & D personnel.

2. Medium districts of from 5,000 to 15,000 students -- these questionnaires were either mailed to the research director, if one was listed, or to the district superintendent.

3. Small districts of under 5,000 students -- questionnaires were mailed directly to the district superintendent.

Each subject in the sample was mailed a packet which included a letter of explanation, a description of the undergraduate research and development training program, and a questionnaire. The respondents were asked to describe their present research and development positions, the number of openings which they anticipated for the coming year, and to make suggestions and comments about the content and scope of the program.

Results

Of the 100 questionnaires which were mailed, 67 were returned. Sixty-four of the returned questionnaires contained usable responses. All of the large districts responded to the questionnaire. Responses from the small and medium districts were divided about equally.

Data Summary

The questionnaire contained 15 questions. Ten of the questions asked for "yes" or "no" responses, and five of the questions were open-ended, or asked for comments and suggestions. The following tables provide a summary of the responses to the questions in the "yes" or "no" categories.

TABLE X

RESPONSES TO QUESTION 1 FROM LARGE, MEDIUM AND SMALL DISTRICTS

"Does your department (or district) employ certified personnel whose major duties are within the areas of research, development, or program evaluation?"

	Large	%	Medium	%	Small	%	Total	%
Yes	20	74	4	31	9	38	33	52
No	7	26	9	69	15	62	31	48
Total	27	100	13	100	24	100	64	100

TABLE XI

RESPONSES TO QUESTION 3 FROM LARGE, MEDIUM AND SMALL DISTRICTS

"Do you feel that graduates of this program would be able to qualify for positions in the research, development, or evaluation activities of your department or district?"

	Large	%	Medium	%	Small	%	Total	%
Yes	16	76	4	80	8	80	28	78
No	5	24	1	20	2	20	8	22
Total	21	100	5	100	10	100	36	100

TABLE XII

RESPONSES TO QUESTION 4 FROM LARGE, MEDIUM AND SMALL DISTRICTS

"Do you have positions now open for which graduates of this program might qualify?"

	Large	%	Medium	%	Small	%	Total	%
Yes	5	27	2	25	1	10	8	21
No	14	73	6	75	10	90	30	79
Total	19	100	8	100	11	100	38	100

TABLE XIII

RESPONSES TO QUESTION 5 FROM LARGE, MEDIUM AND SMALL DISTRICTS

"Do you anticipate any openings for 1969-70 for which graduates of this program might qualify?"

	Large	%	Medium	%	Small	%	Total	%
Yes	8	44	0	0	2	17	10	27
No	10	56	7	100	10	83	27	73
Total	18	100	7	100	12	100	37	100

TABLE XIV

RESPONSES TO QUESTION 6 FROM LARGE, MEDIUM AND SMALL DISTRICTS

"If your school system were to hire one of the graduates of this program as a teacher rather than as a staff member of a research, development, or evaluation team, do you envision specific ways in which his research and development training might be a definite asset to any of your programs or research activities?"

	Large	%	Medium	%	Small	%	Total	%
Yes	19	79	14	100	19	86	52	87
No	5	21	0	0	3	14	8	13
Total	24	100	14	100	22	100	60	100

TABLE XV

RESPONSES TO QUESTION 7 FROM LARGE, MEDIUM AND SMALL DISTRICTS

"Some of our students have expressed an interest in the possibility of serving in a combined role, both as a classroom teacher and as a member of a research, development, or evaluation team.

a. Are there instances of this type of role in your department?"

	Large	%	Medium	%	Small	%	Total	%
Yes	4	16	6	44	7	29	17	27
No	21	84	8	56	17	71	46	73
Total	25	100	14	100	24	100	63	100

TABLE XVI

RESPONSES TO QUESTION 7 FROM LARGE, MEDIUM AND SMALL DISTRICTS

"Some of our students have expressed an interest in the possibility of serving in a combined role, both as a classroom teacher and as a member of a research, development, or evaluation team.

b. Do you consider this type of role as desirable or necessary in your department?"

	Large	%	Medium	%	Small	%	Total	%
Yes	16	70	11	85	20	9	47	80
No	7	30	2	15	3	13	12	20
Total	23	100	13	100	23	100	59	100

TABLE XVII

RESPONSES TO QUESTION 7 FROM LARGE, MEDIUM AND SMALL DISTRICTS

"Some of our students have expressed an interest in the possibility of serving in a combined role, both as a classroom teacher and as a member of a research, development, or evaluation team.

c. If you do not presently employ anyone in this capacity, do you consider this type of role combination likely in the near future?"

	Large	%	Medium	%	Small	%	Total	%
Yes	7	35	8	73	13	77	28	58
No	13	65	3	27	4	24	20	42
Total	20	100	11	100	17	100	48	100

TABLE XVIII

RESPONSES TO QUESTION 7 FROM LARGE, MEDIUM AND SMALL DISTRICTS

"Some of our students have expressed an interest in the possibility of serving in a combined role, both as a classroom teacher and as a member of a research, development, or evaluation team.

d. Do you see any serious problems that might arise from this combination of roles?"

	Large	%	Medium	%	Small	%	Total	%
Yes	12	57	4	31	7	35	23	43
No	9	43	9	69	13	65	31	57
Total	21	100	13	100	20	100	54	100

TABLE XIX

RESPONSES TO QUESTION 8 FROM LARGE, MEDIUM AND SMALL DISTRICTS

"Do you foresee any future trends which would suggest a need in your department for additional personnel with training in research, development, and program evaluation?"

	Large	%	Medium	%	Small	%	Total	%
Yes	21	88	13	93	16	73	50	83
No	3	13	1	7	6	27	10	17
Total	24	100	14	100	22	100	60	100

The results reported in the preceding tables give rather impressive support for both the content and purpose of the undergraduate training program. Questions 3 and 6 are particularly important in regard to future job openings for graduates of the program. In Question 3, 78 per cent of the respondents indicated that graduates might qualify for openings in their respective systems. In Question 6, 87 per cent indicated that graduates of the program would have value to a school system if hired as a teacher rather than as a full time R & D specialist. Furthermore, respondents to question 4 listed approximately 30 positions open for which graduates of this program would qualify. Question 8 is very important in regard to future trends in hiring R & D personnel. Eighty-three per cent of the respondents indicated foreseeing future trends which might call for increasing R & D staff in their respective school systems.

A number of the undergraduates in the program become interested in a dual role combining teaching with R & D activities. Question 7 was an attempt to explore the possibilities for employment in such a role. While the responses to Question (7.a) indicate that only about one-fourth to the systems presently support such positions, the data from Question (7.c) indicates that over half the respondents felt such a role would emerge in their schools in the future. Furthermore, the data from Question (7.b) indicates that a larger majority (80%) of the respondents feel such a role to be desirable or necessary.

Under Question (7.d) individuals were asked to specify problems which they might see related to such an arrangement. Forty-three per cent of the respondents indicated that there might be difficulties in the combined role. Most of the reasons mentioned were related to the problem of dividing time between the two activities. Apparently the instructional staff patterns which now exist in most schools make it very difficult for a classroom teacher to function in more than one role. However, a large number of respondents stressed the importance of more R & D training for classroom teachers.

There were five questions in the questionnaire which asked the respondents for comments and suggestions regarding various aspects of the program. These questions were as follows:

2. What are the types of positions in which you now employ professional personnel in R & D activities?

3a. If your answer to Question 3 is No, what are your reasons? (for not feeling that the program graduates would qualify for openings)

6a. What are some of the capacities in which a teacher with R & D training might be useful in your system or department?

8a. What do you foresee as future trends which would call for more personnel with R & D training in your department or system?

9. What are your comments concerning the adequacies or inadequacies of the undergraduate minor program?

A majority of the comments made concerning the purpose and content of the program were very favorable. Most of these comments centered around the following areas:

1. The need for educational personnel with R & D training and experience.

2. The need for schools to be more accountable to the taxpayers by developing effective means to evaluate and communicate the effectiveness of educational programs.

3. The need to develop new and more effective ways to evaluate the effectiveness of school programs and activities.

4. The importance of R & D personnel to be able to relate and interact with the actual problems facing school teachers and administrators.

Concerning the content of the program, data collection and processing, and training in a "systems analysis" approach to solving educational problems, were mentioned either as absent or as not receiving enough emphasis.

Conclusions

The respondents seemed to be very positive in their interest in and support for the undergraduate training program. Several of the respondents also seemed to be pleased that the University is interested in interacting with public school personnel in order to obtain feedback for the evaluation of a University program. A number of respondents indicated a particular interest in the internship aspect of the training program and expressed a desire to cooperate in providing internship experiences for students.

As expected, only the larger districts and school systems were able to offer specific job opportunities, although many of the smaller systems were sympathetic toward the aims of the program, and would likely be very interested in hiring graduates as teachers rather than full-time R & D personnel.

The positions mentioned as being open were about equally divided between research and evaluation titles. However, it is rather obvious that most of the R & D positions in the Ohio Public Schools are more

oriented to program evaluation or data collection and processing, rather than to actual ongoing research. This is probably due simply to the general shortage of funds. Several respondents mentioned this fact, and suggested that they would be interested in increasing their R & D personnel if the funds were available to do so. From both the tone and the substance of the responses to this questionnaire it can be concluded that there is substantial support from Ohio Public School administrators for an undergraduate training program of this type.

CHAPTER V

FUTURE DIRECTIONS OF THE EXPERIMENTAL PROGRAMS

RESEARCH AND EVALUATION EFFORTS RELATED TO SUBSEQUENT EXPERIMENTAL GROUPS

As was discussed in earlier chapters, program developments have occurred which extend considerably beyond the program provided for the first undergraduate group. The undergraduate program has been revised each year and has been offered to two additional groups of recruited students during the 1968-1969 and 1969-1970 academic years. A fourth group is now being recruited to begin the program during Fall Quarter, 1970. As was discussed earlier, a two-quarter introductory sequence for graduate students was developed in the Spring of 1968 and was initiated experimentally beginning with the Fall Quarter of 1968. This program has been repeated twice since that time, during Spring and Summer Quarters of 1969 and during the Fall Quarter 1969 and Winter Quarter 1970. The program has been extensively revised during each of these cycles and, with further revisions, will be offered on a continuing cyclical basis starting in the Summer of 1970.

A continuing program of evaluation, instrument development and research has been pursued relative to each of these programs and in connection with each subsequent experimental group. The data available from these activities will not be presented in this report but will be made available in subsequent publications. It will be sufficient here to provide the reader with a very brief description of the major activities.

Evaluation Activities

Three types of evaluation activities have been pursued. First, an attempt has been made to continually monitor the programs while in progress. Second, attempts have been made to assess the overall immediate impact of the program upon student behavior. Third, plans are being made and activities now initiated to begin the longitudinal assessment of the impact of the program on students' subsequent careers. Activities relative to program monitoring have involved such techniques as mid-quarter and end-of-the-quarter evaluation surveys and conferences with students, as well as regular staff assessment sessions. From these various activities have come numerous changes which have been made in an attempt to increase the relevance of the programs. Activities relative to assessing the impact of the program have centered primarily around the employment of quasi-experimental designs utilizing pre test and post test arrangements with both the experimental classes and selected control groups. These data have made possible not only the assessment of the impact of the respective programs, but also permit comparisons to be made between undergraduates and graduate groups, thus providing some insight into the relative capacities of both groups. Activities related

to longitudinal assessment of the program are now in the planning stages. Initial anecdotal data from the undergraduate program were presented in Chapter IV.

Research Activities

The research activities connected with the program have centered primarily around attempts at prediction of success. Stepwise regression analyses utilizing relevant variables and common criterion measures have been employed in an attempt to predict success for both undergraduate and graduate groups of students. The reasons for conducting these analyses have varied to some extent between the undergraduate and graduate groups. The primary concern at the undergraduate level is to identify factors which can be used in the selection of students into the program. The program as now operated is primarily envisioned as a specialist program available only to selected undergraduate students. At the graduate level two questions are being dealt with. First, a concern for recruitment is also involved in the sense that some students taking the graduate program do so as a first step in graduate programs in Educational Development. Since recruitment into graduate programs in this field is desirable, it is hoped that information pursuant to this end can be obtained through regression studies undertaken with the graduate classes. A second concern has emerged as a result of the continuing assessment to the program. It has become obvious that graduate students vary to a considerable degree in their ability to deal successfully with the concepts being taught. A decision has been made to eventually track the graduate program, providing more advanced sections for those students capable of dealing with the material at a more sophisticated level and less advanced sections for those students who have greater difficulty with the concepts involved. Regression analyses can provide information concerning graduate student achievement which will be used in developing a valid tracking procedure.

A continuous program of instrument development has emerged in connection with both the evaluation and research activities. Two major instruments can be mentioned. First, the Research Orientation Index, which is used to assess changes in students attitudes toward various facets of educational development; and second, a Research Knowledge Index which has been used to assess changes in student achievement. A questionnaire has also been developed which is used to garner such information as personal background, educational background, prior experience or training in research, educational aspirations in research, and occupational aspirations in research. In addition, course assessment forms have been developed for use at mid-quarter and end-of-quarter periods. The Research Orientation Index and the Research Knowledge Index in particular have been extensively revised and attempts have been made at validation. These two instruments appear to have particular significance in relationship to further research and evaluation efforts.

FUTURE DIRECTIONS OF THE EXPERIMENTAL PROGRAMS

Undergraduate Research Training

Expansion of the undergraduate program can be envisioned in three possible directions: (1) further refinement of the present minor program, (2) the development of an undergraduate major in research, and (3) the development of training in selected research and evaluation techniques as a part of teacher education. We shall deal first with the present undergraduate minor in educational development.

Undergraduate Minor in Educational Development

At the present time the undergraduate minor has been demonstrated to be a viable concept. It provides a middle ground in terms of intensity of training that permits a versatility of student output not available either through a major or a generalist introductory sequence. Students do develop sufficient background to permit them to obtain jobs in research, development or evaluation if they desire. At the same time they are qualified to immediately pursue graduate work in some phase of educational development. Their background in the undergraduate minor permits them to avoid introductory graduate courses in development and enables them to garner a better technical background than they would otherwise be able to do as graduate students. The program also provides excellent background for those students doing graduate work in other professional areas, permitting them to avoid basic courses in research methods now created for graduate students and allowing them to move with considerable sophistication into the research literature in their respective fields.

Approximately half of the graduates of the program do elect to go into teaching directly upon graduation. These individuals represent a resource of considerable potential within their local schools and school districts which has hitherto been unavailable from among the ranks of teachers. A next major step in the development of the research minor lies in exploring the fuller implications of this latter form of student output.

It is possible to envision two major changes which could yet be made in the program. The first of these concerns content. It does appear that more of an emphasis should be placed in the program upon program evaluation techniques coupled with some increased background in data processing. Changes of this nature would focus the program more directly upon types of skills which are most likely to be used by students. Most students seeking full-time employment will probably be involved in evaluation activities in school systems, while persons going into teaching are most apt to participate in evaluation activities being conducted by the system or in evaluating their own teaching methods and materials. Some

further background in data processing techniques, coupled with the present background in statistical concepts, would be most useful to those students who are headed for full-time employment in research or evaluation.

As already mentioned, one feature of the undergraduate program that has as yet been inadequately pursued concerns those students completing the program who go directly into teaching roles. These individuals are capable of modes of behavior not ordinarily associated with conventional classroom instruction. With the type of training which they have had they will of course be in a position to attempt to systematically assess the materials and methods which they utilize in their own teaching. At the same time, they would represent within the building in which they were placed a certain degree of expertise which could be of benefit to any group efforts being conducted within that building relative to evaluation or that would permit them to serve some role in relationship to a system-wide evaluation operation. Activities, particularly of the latter type, will place these individuals in a type of role which is not commonly accepted in a typical school building. This role will alter to some extent the relationships with other teachers in the building as well as potentially with the principal. This altered role has implicit within it potential for the generation of conflict situations. Thus, an important aspect of the program which must be more fully developed concerns the proper placement of these graduates in situations where their skills can be adequately deployed.

In initially testing out the placement of such graduates, it will be necessary to pay attention to several key factors. First, it will be important that they be placed in a building in which the climate is conducive to the types of behavior which they are trained to exhibit. This means that the administrator of the building must be attuned to their presence, must be in sympathy with the type of role which they can perform, and must exert some care in assuring the maintenance of an adequate environment. Second, careful thought must be given beforehand to the relationships which may develop between the graduate being placed and other teachers in the building. It may be particularly important to carefully establish in the minds of other teachers the kind of service which the new teacher is prepared to render, and to establish as best as possible the notion that no threat is implied to the status of other teachers not possessing the particular array of skills borne by the new teacher. Providing in-service training for other teachers on a volunteer basis may be helpful both in facilitating communication with the new teacher and in furthering the development of evaluation activities in the building. Adjustments may also be required in such matters as deployment of time and to some extent deployment of resources. Careful thought will probably have to be placed into the arrangements of these matters, for other teachers may be quick to react to any misunderstood alteration in the status quo.

In addition to conditioning the environment, it may also be necessary that the new teacher have access to expertise beyond that provided through his or her training. One alternative may be to open pathways back to the university so that these individuals may obtain help when necessary. This suggests establishing relationships between the university and schools which have, up to this time, not been common, and has clear implications for deployment of time on the part of the program staff within the university. Implicit here is the notion of a commitment not only to provide pre-service training but to support professional activities of individuals graduating from the program. It is possible, of course, that in larger school systems expertise sufficient to the problems which may arise will be available within the central staff of the system. In these situations, special arrangements with universitites as just discussed could be less important.

Undergraduate Major

The degree of success that has been experienced through the present undergraduate minor in research clearly supports the concept of an undergraduate major. Two factors are particularly noteworthy in this regard. First, it has been demonstrated that those students who wish full-time positions in this field may obtain employment even with a bachelor's degree. Second, many students have made the decision not only to accept positions of full-time employment, but to pursue graduate work and to continue their careers at more advanced levels. Several individuals with this intent in mind have already made inquiries about the possibility of establishing their undergraduate major in educational research. Such a combination of professional opportunity and genuine student motivation makes the development of an undergraduate major inevitable.

While the possibility of an undergraduate major has been discussed, concrete designing of such a program has not as yet begun. Nonetheless, several considerations which now appear to be important in the development of such a program may be discussed. First, the minor program as now developed could easily serve as a basic core for a major. Second, beyond this core two types of activities could be identified. (1) Students could benefit from additional formalized learning experiences in more advanced courses in research, development and evaluation methodology. Such courses are available to graduate students and could, with little difficulty, be made available to undergraduates. In addition, courses in such areas as data processing or computer programming are already available to undergraduates in other departments of the university. (2) The internship concept already present in the minor could be expanded. Students could be urged to establish a longitudinal relationship with a research or evaluation setting offering them meaningful experiences in areas that were of particular interest to them. It might also be possible for students to be placed for shorter periods of times in different

settings with the notion of providing a wider range of experience. (3) One major over-arching consideration has to do with the relationship of such a program to other aspects of professional preparation at the undergraduate level, namely teacher education. It should be clear that educational researchers do not operate in a vacuum, but that their skills instead are employed in a number of roles related to various aspects of the educational enterprise. Familiarity with various aspects of the educational system would therefore be important as overall background providing perspective to specialist training in research or evaluation. Particularly, some significant contact should be made with classroom behavior. Such experience could hopefully be obtained without devoting large amounts of time to conventional teacher preparation.

Students graduating from a program such as that described above would be in an excellent position not only for employment but also for advanced studies. A large majority of students now entering doctoral programs in various aspects of educational development have little background in the empirical methodology important to this general arena. They must therefore devote a substantial amount of their graduate work, even at the doctoral level, in building a basic vocabulary of empirical skills. All too often, they have precious little time to expand their understanding of the problems with which they will deal once their graduate work is completed. Thus they often have insufficient orientation to these problems and are forced into professional situations before they have adequately integrated the considerable amount of technical learning which they have undergone. If, however, students were to enter upon graduate work with some real command of basic empirical skills and with some initial broad perspective of the educational enterprise they would be able to not only expand their technical base but would have some energy and time remaining to develop some understanding of the types of problems which they will face. This should permit them to enter into professional work at the completion of their educational period with a greater degree of competency and with a greater feeling of confidence in their own ability.

Some institutional problems related to the generation of the major should be noted. The first of these pertains to the overall problem of certification. Currently many school systems are unable to or will not employ individuals who do not have basic certificates either as teachers or as administrators. Many individuals who have the types of skills necessary to evaluation and research activities within school systems do not possess professional training in teaching or administration and thus do not possess professional certification. Under these conditions it often becomes difficult for school systems to obtain individuals with the skills which they need and at the same time for individuals with these skills to find such positions if they are interested in them. This problem is compounded in institutions of higher learning where very often undergraduate and even graduate degrees in education either required the obtaining of certificates or are based on prior possession of them. Some breakthrough on the certification issue is therefore a must.

Emerging from this general problem has come the discussion of certification for research and evaluation personnel. The wisdom of such action may be questioned, for it would be difficult to reach agreement on criteria for certification. The various areas in which personnel are needed and the skills which they would use are simply not well enough defined. A wiser course of action would appear to be the revision of institutional policies to permit the employment of individuals whose skills are relevant to the needs of the institution, irrespective of certification.

One final factor of importance to the establishment of an undergraduate major must be mentioned. Ultimately it will be important that adequate selection procedures be developed. If the present undergraduate minor can be seen as a core for a potential major, it could be that selection into a major curriculum could be based upon performance, interests and motivation as expressed in the initial phases of the undergraduate minor. Thus, selection could be based primarily upon demonstrated qualities rather than upon a series of predictor variables. Such an approach places a major burden upon selection procedures utilized in recruiting individuals into the minor curriculum. A partial solution may be found to this problem through the potential program expansion to be described in the following section. If, as will be discussed, the initial one or two quarters of the present minor were developed into a series of learning experiences which could be made available generally to the undergraduate teacher education program, then selection into either the minor or the major could be at least partially accomplished through the development of interests on the part of students and demonstration of sufficient ability through their experiences in these first one or two quarters. Additional procedures designed specifically to attract students of high ability either from within the College of Education or from related Social Science fields would probably also be advisable. Ideally, recruitment procedures could involve a variety of techniques.

Implications of Undergraduate Research Training for Teacher Education

In recent years teacher education generally has been subjected to a good deal of criticism and has undergone substantial change, at least in terms of the evolution of experimental programs related to the inner-city. It is being recognized that many types of skills are necessary in order for a teacher to be able to adequately handle the many important responsibilities which she faces in the classroom. Such realizations often result in pressures to add more and more requirements to an already existing curriculum. It may thus seem somewhat strange and perhaps presumptuous to suggest adding yet another set of experiences into an already overburdened arena. And yet, the development of research and evaluation training designed specifically to impart skills useful to teachers is clearly one important implication of the experiences garnered through

experiments with the undergraduate research minor. As in the case of the undergraduate major, such a development is being considered but is not yet substantially into the planning stage. It is possible, however, to discuss what now appear to be several important considerations.

A major overriding assumption should be that such training ought to be specified to the exact needs of teachers. Such an assumption indicates that the traditional concern for a particular mode of inquiry must be set aside and specific behavioral skills useful in the classroom setting must be identified. A second important consideration is that the mode of training to be developed should permit the development of functional skills. Such training could be envisioned as constituting the initial stages in the present research minor. If such an alternative proves to be feasible, then it would be possible eventually to create a well-knit undergraduate curriculum designed to serve a variety of functions.

FUTURE DEVELOPMENT IN THE GRADUATE EXPERIMENTAL PROGRAM

The graduate program has been designed primarily to serve as introductory training for all graduate students across the college, regardless of field of specialization. It is thus primarily a service program. It also has a secondary purpose of providing basic training for those majors in educational development who have had no previous background. The large majority of students, however, come from other professional areas within the college.

The content of the program has been fairly well established. The major focus is upon research rather than upon evaluation or other types of supporting activities involving empirical techniques. This is deemed appropriate within the context of graduate training in which the major focus, particularly with respect to theses and dissertations, is upon scholarship.

Two major changes not related to content may be cited. First, it has become obvious that a wide variety of backgrounds exist among students who elect to come into the program. A decision has therefore been made to design a tracking operation with respect to the placement of students into sections of the course. Such a tracking system will require the identification of criteria to be used in placement. It will also require some means by which these criteria may be measured prior to admittance into the program.

A second major change that can be envisioned for the graduate program pertains to the method of instruction. Present methods of instruction are, for the most part, traditional involving lecture and seminar techniques. It is obvious, particularly in view of the diversity of student background, that an instructional systems approach must be taken. Such a system would probably involve self-instructional devices, perhaps

even utilizing a multi-media approach, coupled with small group discussions. It is highly probable that lecture time could be eliminated in favor of increased small group activity and increased time devoted to self-instructional materials. Such a system would more adequately deal with individual differences in learning behavior and background and would permit the program eventually to move beyond the tracking system just proposed above. It would of course still be important to diagnose student needs at the point of entry into the program.

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APPENDIX A

TABLE XX

FIRST ITEM ANALYSIS FOR INQUIRY ORIENTATION SCALE
(82 items)

	Item	Pearson r with Total Score	Mean	Standard Deviation
1.	Educational research should attempt to provide immediate answers to educational problems.	.08	2.08	1.11
2.	A career in research does not appeal to me.	.50	1.93	1.14
3.	I do not feel a compelling need to work hard at seeking answers to questions.	.29	3.23	.68
4.	I feel that the teacher who should be regarded highly is one who is eager to try new techniques in the classroom.	.12	3.00	.80
5.	I wish there were not so many new ideas and techniques in education today.	.31	3.38	.66
6.	Busy teachers do not have the time or energy to pursue research.	.27	2.50	1.02
7.	The reward for doing research is the thrill and satisfaction of contributing to the solution of problems.	.22	2.87	.73
8.	Many great educators never studied nor did research; so I see no merit in it.	.30	3.39	.59
9.	Teachers should use methods of research to seek solutions to classroom problems, rather than refer their problems to others in the school.	.23	2.26	.94
10.	As a teacher, I would be more likely to try out a new idea if I were dissatisfied with current school practice.	.16	2.98	.82
11.	Research findings should be accepted with a grain of salt.	.03	2.44	1.08
12.	Interdisciplinary cooperation is essential to the solution of problems in education.	.23	3.23	.75

TABLE XX -Continued

	Item	Pearson r with Total Score	Mean	Standard Deviation
13.	Taking a course in research is all right for some teachers, but a waste of time for most.	.49	2.85	.81
14.	Educational research is not a moving stream but a stagnant pool.	.44	3.05	.75
15.	I would enjoy developing new materials or techniques to improve school practice.	.55	3.10	.81
16.	I often feel that so-called educational problems are more imagined than real.	.26	3.05	.82
17.	I would like to enter research in order to test educational theories.	.38	2.00	.92
18.	Researchers take themselves too seriously.	.41	2.39	.74
19.	I feel a need to challenge the methods and conclusions of studies.	.34	2.46	.82
20.	New educational programs should be checked to determine whether they are worth the time and money spent on them.	.08	3.19	.61
21.	Science is incompatible with the spiritual goals of life.	.26	3.23	.76
22.	Faith in scientific research is not incompatible with any other kind of faith.	.23	2.68	1.05
23.	The trial and error process of problem solution is much too frustrating.	.02	2.27	.95
24.	I do not feel adequate in reading and interpreting published research.	.30	1.82	1.05
25.	Scientific research is one of man's most powerful and noble means for searching out truth.	.41	3.04	.64
26.	The average student in education does not have the ability to take training in educational research and development.	.19	2.60	.87
27.	I feel that the emphasis in my field should be more preparation for research than professional practice.	.31	1.32	.89
28.	I have a feeling of inadequacy to do a task which seems to involve the scientific approach.	.31	2.37	.94

TABLE XX -Continued

	Item	Pearson r with Total Score	Mean	Standard Deviation
29.	Somehow I am not convinced that educational research can offer me an important and significant career.	.50	2.11	1.01
30.	For proper guidance in educational decisions, we should rely upon our traditions and values rather than upon research.	.51	3.25	.58
31.	I am not likely to try a new idea or technique unless I am pretty sure it will work.	.32	2.50	1.01
32.	Research is of little help in meeting classroom problems.	.55	3.07	.55
33.	I am primarily interested in doing research which has practical and social value.	.23	2.71	.78
34.	An educator can do very well without knowledge of research methods.	.39	2.51	.96
35.	Educational investigators are entitled to invent their own methods and techniques to be used in the analysis of educational problems.	.11	2.52	.81
36.	The uncertainties involved in the process of testing a new idea upset me.	.34	2.78	.81
37.	The average student in education should be interested in becoming involved in some research activity after graduation.	.48	2.06	.97
38.	Research consists mainly of techniques and gadgetry.	.52	2.87	.70
39.	A position in the school system would more likely interest me, if it offered opportunities for experimenting with new idoas.	.47	3.04	.70
40.	The study of research methods is horrifying.	.58	3.10	.78
41.	With the necessary training and a willingness to work, the average individual can do research in education.	.47	2.83	.63

TABLE XX-Continued

	Item	Pearson r with Total Score	Mean	Standard Deviation
42.	Knowledge of a substantive area is more useful to an educational researcher than knowledge of research methods.	.25	2.25	.74
43.	The U.S. Government should equally support basic research on educational theories and research for application of theory to educational practice.	.24	2.75	.84
44.	A teacher's participation in research will improve her teaching more than reliance upon the research of others.	.37	2.64	.82
45.	The best way to influence the educational policies of a public school is through study of its problems.	.25	2.83	.77
46.	Researchers have too much of a superiority complex.	.43	2.56	.76
47.	I would most likely engage in the solution of an educational problem if it gave me a feeling of personal satisfaction or fulfillment.	.16	2.95	.66
48.	My current interest in research seems much less than that of other education students whom I know.	.32	2.58	.79
49.	Research activity on the part of the teacher is a growth-inducing enterprise both for them and their students.	.51	2.97	.57
50.	I feel confident about my ability to engage in the solution of educational problems.	.45	2.44	.87
51.	Descriptions of research procedures are often hard to follow and difficult to comprehend.	.35	1.90	.90
52.	Educational researchers should be trained to produce basic information relevant to education, rather than simply adapt the findings of fields outside education.	.13	2.59	.86
53.	Researchers should not receive more pay than teachers.	.22	2.02	.80
54.	The scientific method offers the best approach that man has thus far developed for the solution of problems.	.25	2.64	.80

TABLE XX-Continued

	Item	Pearson r with Total Score	Mean	Standard Deviation
55.	I do not believe that scientific research does more for mankind than any other professional activity.	.25	2.00	1.01
56.	Research is not more satisfying than other professional roles found in education today.	.06	1.81	.89
57.	Research offers many opportunities for professional advancement.	.36	2.85	.68
58.	I would rather be known and respected by the National Teachers Association than by the National Educational Research Association.	.31	2.14	.70
59.	Educational researchers should be primarily concerned that their results may be used to update school practices.	.02	2.73	.85
60.	Teachers should not bother to test new techniques, unless they know they will be eligible for extra pay or higher positions.	.34	3.50	.56
61.	Teachers should read research journals in order to determine whether new techniques are worth trying in the classroom.	.20	3.00	.61
62.	Teachers should not engage in experiments on new techniques unless they can foresee getting some results fairly soon.	.31	2.83	.70
63.	I am never completely satisfied with my solutions to problems; I realize that time may prove me wrong.	.18	2.55	.89
64.	My temperament and self-concept will probably hinder me from pursuing a career in research.	.49	2.30	1.01
65.	Educational research should be conducted mainly by educationists, rather than by experts from other disciplines.	.05	2.14	1.07
66.	The results of research are just a lot baloney.	.55	3.47	.58
67.	The scientific method is applicable not only to the problems of the scientific laboratory, but equally applicable to problems faced by the school teacher.	.44	3.00	.72

TABLE XX-Continued

	Item	Pearson r with Total Score	Mean	Standard Deviation
68.	Research may be valuable for psychologists, but not as valuable for educators.	.52	3.16	.69
69.	I see and feel deeply a need for increased research information on problems in my field.	.65	3.14	.72
70.	I believe that students in education should receive some basic training in the solution of educational problems.	.50	3.18	.63
71.	I am quite confident about my ability to learn research methods.	.52	2.71	.77
72.	Much self-satisfaction can be derived from research.	.54	2.81	.65
73.	Teachers should learn from the results of research studies, rather than do research themselves.	.33	2.56	.77
74.	I am challenged by educational problems I can't immediately understand or solve.	.48	2.79	.67
75.	Research should be carried on by school people in order to improve classroom situations.	.28	2.90	.68
76.	If my colleagues did not approve of ideas for a study, I probably would not try them.	.27	2.70	.73
77.	Persons who have been trained outside the field of education are the most competent investigators of educational problems.	.25	2.80	.69
78.	Thorndike has contributed more to education than Dewey.	.10	1.72	.72
79.	Educational practice should be based mainly upon the results of rigorous research.	.40	2.07	.92
80.	Sticking to tried and true solutions to educational problems is better than trying to discover new solutions that may not work.	.38	3.17	.55
81.	The search for solutions to problems in my field is fascinating to me.	.59	2.91	.79
82.	What researchers do is simply poking their noses in other people's business.	.48	3.40	.63

APPENDIX B

Educational Aspirations Questions and Scoring

I. Future Educational Plans

Check the one statement that best applies to your future educational plans after receiving the bachelor's degree:

	Statement	Score
a.	No plans for any kind of graduate or professional school seen at this time	(1)
b.	Entry to graduate or professional school in an area other than education as a part-time student at a later date	(2)
c.	Entry to graduate or professional school in an area other than education as a full-time student at a later date	(3)
d.	Immediate entry to graduate or professional school in an area other than education as a part-time student	(4)
e.	Immediate entry to graduate or professional school in an area other than education as a full-time student	(5)
f.	Entry to graduate school in education as a part-time student at a later date	(6)
g.	Entry to graduate school in education as a full-time student at a later date	(7)
h.	Immediate entry to graduate school in education as a part-time student	(8)
i.	Immediate entry to graduate school in education as a full-time student	(9)

II. Highest Level Degree

Check the highest level degree you realistically wish to obtain

	Degree	Score
a.	B.S.; A.B. or B.A.; B.F.A.	(1)
b.	M.A. or A.M.; M.Ed.; M.F.A.	(2)
c.	Ph.D.; Ed.D.; M.D.; etc.	(3)

APPENDIX C

Occupational Aspirations Questions and Scoring

I. Major and Minor Area of First and Second Choices

If you plan to take some graduate or professional work, list your first and second choices for a specific major and minor area of study:

	Major	Minor
a. 1st	_____	_____
b. 2nd	_____	_____

II. Interest in Educational Research-Development as a Primary Occupation

Indicate your personal interest in participating in each of the following occupations within education as a primary future activity by circling the number corresponding to your choice (only Research-Development scored):

5 Extremely Interested	4 Interested	3 Undecided or Neutral	2 Uninterested	1 Extremely Uninterested

a. Teaching

b. Advising and/or Counseling

c. Research-Development 5 4 3 2 1

d. Public Service

e. Administration

f. Committee Work

III. Interest in Participating in the Following Educational Research-Development Activities Regardless of Primary Occupational Commitment

Indicate your personal interest in participating in each of the following educational research-development activities regardless of your primary occupational commitment by circling the number corresponding to your choice:

	5 Extremely Interested	4 Interested	3 Undecided or Neutral	2 Uninterested	1 Extremely Uninterested
a.	Conducting research to test educational theories				5 4 3 2 1
b.	Developing new material and techniques				5 4 3 2 1
c.	Disseminating new materials and techniques				5 4 3 2 1
d.	Testing new ideas in the school				5 4 3 2 1
e.	Evaluating educational programs				5 4 3 2 1

APPENDIX D

Undergraduate Education Program Attitudes
Questions and Scoring

Directions

A. For Pretest: Considering only the past (1966-1967) academic year, indicate your preference for each of the following questions by checking the category responding to your choice.

B. For Posttest: Considering only the past (1967-1968) academic year, indicate your preference for each of the following questions by checking the category corresponding to your choice.

Questions and Scoring

1. In terms of your PROFESSIONAL interests, during the past academic year how appropriate has the course work in education generally been?

5	4	3	2	1
Extremely Appropriate	Appropriate	Undecided or Neutral	Inappropriate	Extremely Inappropriate

2. In terms of your ACADEMIC and INTELLECTUAL interests, during the past academic year how challenging has the course work in education generally been?

1	2	3	4	5
Extremely Unchallenging	Unchallenging	Undecided or Neutral	Challenging	Extremely Challenging

3. During this past academic year, what degree of freedom for self-direction have you generally been given in courses in education?

1	2	3	4	5
Very Little	Little	Undecided	Much	Very Much

4. During this past academic year, how would you characterize student-faculty interaction outside of the classroom in the College of Education?

1	2	3	4	5
Very Little Interaction	Little Interaction	Undecided or Neutral	Much Interaction	Very Much Interaction

5. During the past academic year, what is the proportion of courses in the College of Education in which you have experienced superior instruction?

5	4	3	2	1
Nearly All	A Large Proportion	Undecided or Neutral	A Small Proportion	Nearly None